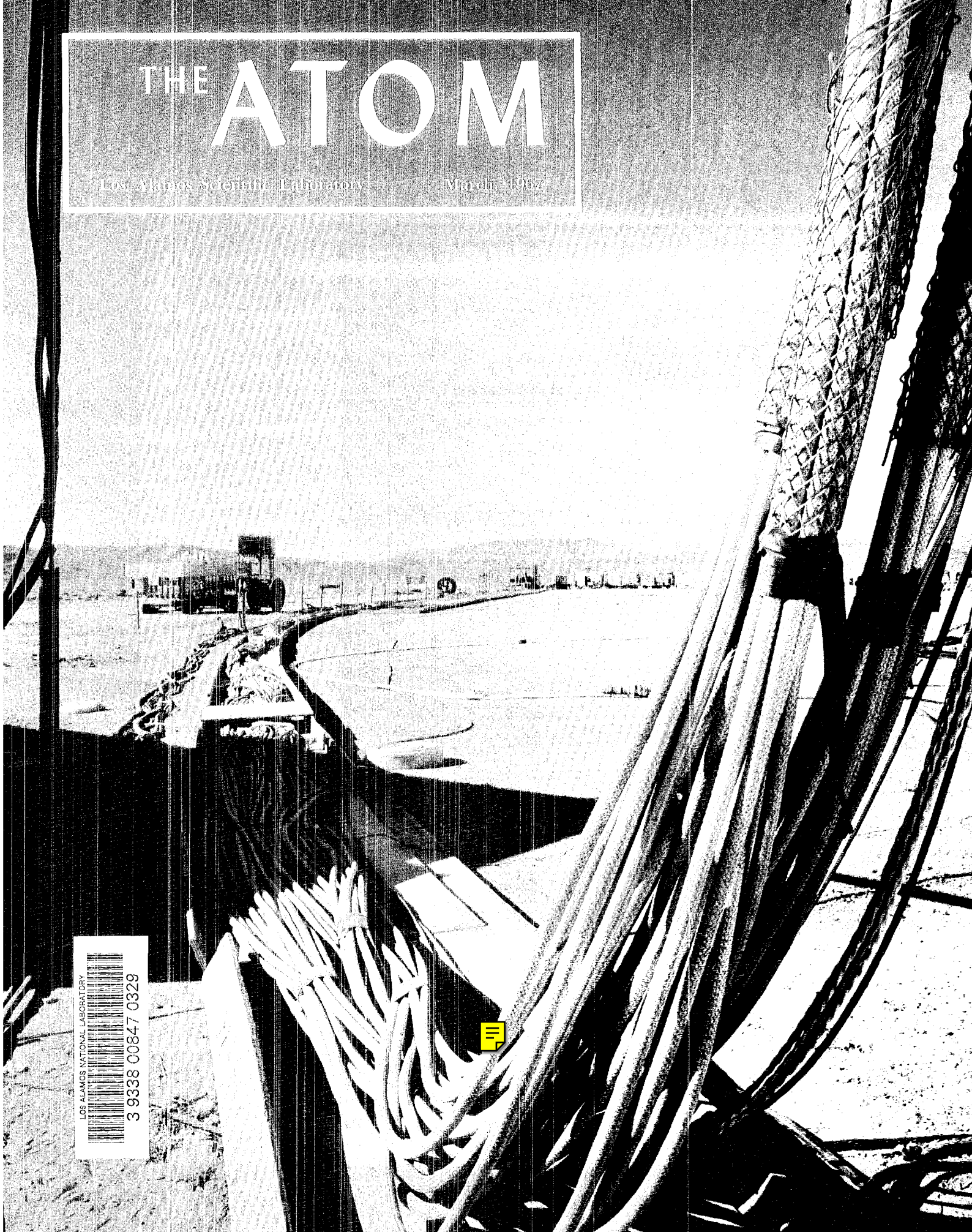
THE ATOM

Los Alamos Scientific Laboratory — March 1962



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THE ATOM

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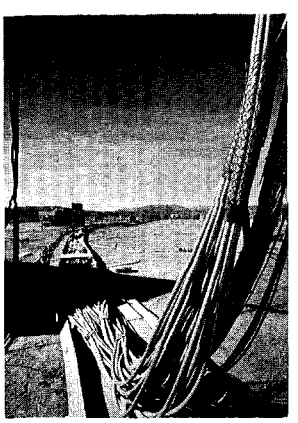


COVER:
Dozens of miles of cables are the key to getting the data from an underground nuclear explosion to scientific recording instruments. Bill Jack Rodgers photographed the spaghetti-like scene at the Persimmon test. Story begins on page 10.

J. Robert Oppenheimer . . .

'Such men are incredibly rare'

Oppenheimer (second row, left) returned to Los Alamos in August, 1946, for a six-day nuclear physics conference in Theater 2. Richard Feynman is next to Oppenheimer, and in front row, from left, are Norris Bradbury, who succeeded Oppenheimer as Laboratory director in October, 1945; John Manley, now LASL research advisor; Enrico Fermi; and J. M. B. Kellogg, who retired last fall as assistant director for scientific personnel.

FLAGS FLEW AT HALF-STAFF in Los Alamos last month, in memory of the man who, perhaps more than any other, was responsible for Los Alamos's very existence.

J. Robert Oppenheimer died Feb. 18.

It was Oppenheimer who suggested the location for Site Y—now Los Alamos. It was Oppenheimer who directed the frantic crash program in Los Alamos to develop the world's first atomic bomb. It is Oppenheimer whom former colleagues and the general public alike credit with the success of the project.

And it is Oppenheimer who is remembered not only as an outstanding scientist but also as a warm and sensitive human being who cooked fresh trout for breakfast at the side of a stream, who rode a horse named Crisis that only he could handle, who asked comedian Bob Hope for his autograph.

The tribulations of the wartime days in Los Alamos are already almost legendary—undoubtedly for the most part because of the way Oppenheimer managed to engender such esprit de corps among the improbable collection of people gathered at an improbable place for that improbable secret mission.

Over and over, his Project Y colleagues point to his sense of democracy as the biggest factor in the high morale found in Los Alamos—despite the rather primitive working and living conditions. The first scientists who arrived in Los Alamos, fresh from university communities, found themselves living and working in hastily-assembled wood buildings, isolated by both geography and government decree, with the Army imposing restrictions foreign to the scientific mind.

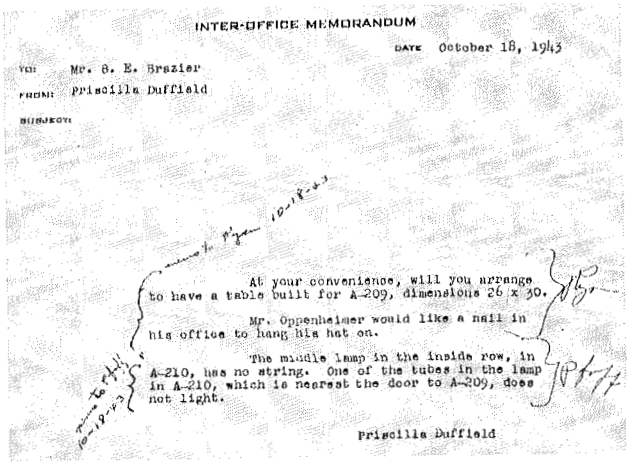
Because of the secrecy of the Manhattan Project, the military virtually insisted that individual scientific projects be strictly compartmentalized so that no one could see the overall progress—or purpose—of the mission. But Oppenheimer balked at this, knowing that cross-fertilization of ideas among scientists is infinitely useful in solving knotty problems. It was for this major victory over military rigidity that his colleagues credit him with not only the success of the project but the high morale that made it possible. And the weekly colloquia—that began in an Army barracks surrounded by MPs—continue in Los Alamos today.

His sense of democracy was evident in other ways, too—from coping with scientific problems to placating distraught housewives who found living conditions something less than ideal.

L. D. P. King, now in charge of LASL's office for Rover flight safety, recalls the time Oppenheimer found himself with two equally qualified scientists to fill a group leader vacancy. Because it was his nature to be uncompromisingly fair, "Oppie" finally solved the problem by having the two men draw straws.

Said R. E. Schreiber, LASL technical associate director, Oppenheimer's decisions were accepted be-

Oppenheimer: *As Los Alamos Knew Him*



INTER-OFFICE MEMORANDUM

DATE October 18, 1943

TO: Mr. S. E. Brazier

FROM: Priscilla Duffield

SUBJECT:

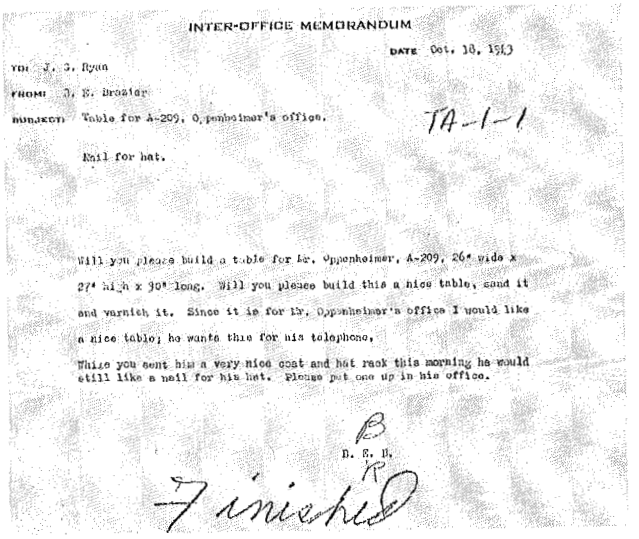
At your convenience, will you arrange to have a table built for A-209, dimensions 26 x 30.

Mr. Oppenheimer would like a nail in his office to hang his hat on.

The middle lamp in the inside row, in A-210, has no string. One of the tubes in the lamp in A-210, which is nearest the door to A-209, does not light.

Priscilla Duffield

Two memos recently unearthed by Ben Williams, ENG-3, reveal something of the Oppenheimer character—as well as the humble beginnings of Los Alamos.



INTER-OFFICE MEMORANDUM

DATE Oct. 18, 1943

TO: J. J. Ryan

FROM: S. E. Brazier

SUBJECT: Table for A-209, Oppenheimer's office. TA-1-1

Nail for hat.

Will you please build a table for Mr. Oppenheimer, A-209, 26" wide x 27" high x 30" long. Will you please build this a nice table, sand it and varnish it. Since it is for Mr. Oppenheimer's office I would like a nice table; he wants this for his telephone.

While you sent him a very nice coat and hat rack this morning he would still like a nail for his hat. Please put one up in his office.

B

S. E. B.

Finished

cause "his reputation for dispassionate analysis and obvious concern for fairness and individual rights carried weight where the simple exercise of his authority might have caused resentment."

It is also because of Oppenheimer that there are trees in Los Alamos, according to N. C. Metropolis, T-DOT. When Oppenheimer arrived at Site Y to check on the progress of construction in early 1943, just before the project began in Los Alamos, he found the contractor ruthlessly bulldozing out all the trees in his path. Oppenheimer said the trees should remain—and they have to this day.

Dorothy McKibbin, one of Project Y's first employes, who managed the Santa Fe "front" for the secret government project, recalls Oppenheimer's love for northern New Mexico. He had visited this area many times before Site Y existed, and he owned a ranch high in the Pecos Valley.

While Oppenheimer was Laboratory director, he and Kitty, his wife, would sometimes ride from Los Alamos to the ranch—a two-day trip by horseback—camping out overnight. Though trailed by MPs, Oppenheimer found it a rare and welcome change from the tension of building an atomic bomb.

Oppenheimer thoroughly enjoyed the outdoors and took delight in camping out, fishing the mountain streams for breakfast trout or gathering wild watercress for sandwiches near a spring at the ranch. "Robert was a great cook," Mrs. McKibbin said.

continued on next page

The Oppenheimers entertained at their "bathtub row" home—one of the original stone Ranch School houses—after a concert in September, 1946. From left: Mrs. Berlyn Brixner, Eric Jette, who was chemistry-metallurgy division leader, W. F. Walters, Jette's assistant, and Oppenheimer. Mrs. Jette and Mrs. Walters are in foreground.

N. C. Metropolis photographed Oppie with Dorothy McKibbin and Mrs. Frank Oppenheimer at brother Frank's ranch at Pagosa Springs, Colo.

Shortly after the end of World War II, military troops stationed in Los Alamos paraded in review for Col. Gerald R. Tyler, right, the post commander. From left are Col. L. E. Seeman, liaison officer for General Groves and associate director of the Laboratory for administration and services, Capt. R. A. Larkin, senior U.S. Naval officer in Los Alamos, and Oppenheimer.

Oppenheimer . . .

continued from preceding page

Both of the Oppenheimers enjoyed riding, and Oppie had a favorite horse—named Crisis—so high spirited few could get near it. But, said Mrs. McKibbin, Crisis and Oppenheimer seemed to understand each other, and only Oppie could ride it.

Oppenheimer's "trademark," his pork pie hat, became well known, and it was because of his work at Site Y that he wore it. Before Los Alamos, he had always worn a wide-brimmed cowboy style hat, Mrs. McKibbin said. But Gen. Leslie R. Groves, director of the Manhattan District—and never one to overlook the slightest detail that might cause a security problem—objected to the cowboy hat, fearing Oppenheimer would be too easily recognized, and possibly followed, when he was away from the site.

Mrs. McKibbin recalled one time shortly after the war when Oppenheimer's young son, Peter, stayed with her for a few days. After Peter had left, Mrs. McKibbin discovered he had left his hat on the bed —a battered pork pie just like his father's.

After they left Los Alamos for Princeton, the Oppenheimers occasionally visited the Southwest, staying at their ranch or with Oppie's brother, Frank, in Colorado and sometimes for a day or two with Mrs. McKibbin in Santa Fe.

Metropolis recalls a plane trip Oppenheimer made from Denver to New York after a visit with his brother. Also a passenger on the plane, comedian Bob Hope recognized Oppenheimer and asked for his autograph. Oppie agreed, providing he could have Hope's autograph, "to keep me in good standing with my son," he later told Metropolis.

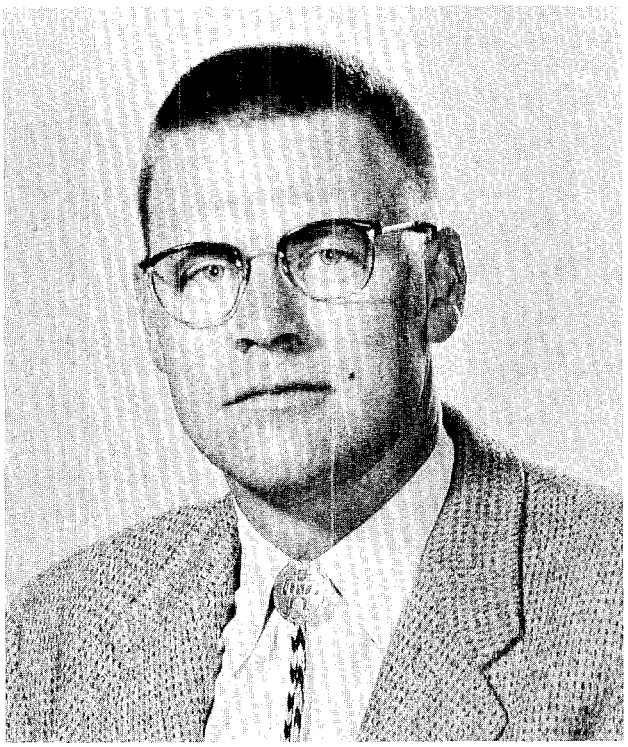
What was perhaps unique about Oppenheimer among men whose fame is considerable is that he was as much revered by those who knew him well as by those who merely idolize.

Referring to that first Los Alamos project, Schreiber said, "The ultimate success of the gamble is a matter of history. What can never be adequately chronicled are the personal memories of those people who looked to 'Oppie' as their leader in this dramatic entrance into the atomic age. These memories include both the cool, incisive announcement of major decisions and the warm personal touch of a sensitive and understanding human being."

Oppenheimer's successor, Laboratory Director Norris Bradbury, remarked, "His stamp upon the character of Los Alamos was profound and permanent; his impression upon those who knew him was no less so.

"Such men are incredibly rare."

Robert Thorn To Receive Lawrence Award



Robert N. Thorn, T-2 group leader, is one of this year's recipients of the Ernest O. Lawrence Memorial Award for meritorious contributions in the field of atomic energy.

The awards are presented annually by the Atomic Energy Commission to no more than five American scientists and are among the highest honors in the nation for scientific achievement.

Thorn, along with four other winners, will receive his award at special ceremonies at the Carnegie Institution auditorium, Washington, D.C. on April 27.

The seventh LASL scientist to receive a Lawrence award since it was first presented in 1960, Thorn and his four co-winners each will receive a gold medal, a citation and $5,000.

Thorn will be specifically cited "for his eminent role in initiating and conducting theoretical studies of thermonuclear weapon design, for his outstanding performance in adapting results of theoretical studies to practical device designs and for his investigations of the effects and particular requirements of our defensive nuclear weapons."

The other four Lawrence award winners this year are Mortimer M. Elkind of the National Cancer Institute, National Institutes of Health, Bethesda, Md.; John M. Googin, Union Carbide Nuclear Division, Oak Ridge, Tenn.; Allan F. Henry, Bettis Atomic Power Laboratory, Pittsburgh, Pa.; and John O. Rassmussen, Lawrence Radiation Laboratory, Berkeley, Calif.

Thorn joined the Los Alamos Scientific Laboratory in 1953 after receiving his doctorate in theoretical physics from Harvard University. He also earned his bachelor of arts and master of arts degrees at Harvard. He served with the U.S. Army in Europe from 1942 to 1946 and received a number of decorations, including the Purple Heart. He was born in Coeur d'Alene, Idaho, and grew up in Klickitat, Wash.

Thorn has been recognized for making distinct contributions toward a better understanding of the vulnerability of nuclear weapons systems. He is a member of the nuclear panel of the Air Force Scientific Advisory Board and a member of the Defense Atomic Support Agency's Scientific Advisory Group on Effects.

He and his wife, Lorraine, an employe of CMB-1, have four children and live at 1472 Oakwood Loop, Los Alamos.

Previous LASL winners of the E. O. Lawrence award include Conrad Longmire, alternate T division leader, 1961; James Taub, CMB-6 group leader, and Louis Rosen, MP division leader, 1963; George Cowan, J-11 group leader, 1965; Harold Agnew, W division leader, and Ernest Anderson, a member of the H-4 biophysics staff, 1966.

The award was established by the Atomic Energy Commission in memory of the late Ernest Orlando Lawrence, inventor of the cyclotron and director of the radiation laboratory at Berkeley and Livermore that now bears his name.

Sailing Scientist Returns–Undaunted–From Ill-fated Cruise

By Bill Richmond

The list of experienced able-bodied seamen qualified to handle large sailing ships today is small. Require the seaman to have a Ph.D. in mathematics, and the list would be narrowed to a select few.

Heading this list is Thomas C. Doyle, a mathematician at the Los Alamos Scientific Laboratory.

Doyle, a member of group T-1, recently returned from a seven-month cruise aboard the yacht *Verona* —a cruise cut short when the yacht burned and sank off the west coast of Africa in late February.

In a sailing career that spans 40 years, this was the first time Doyle was forced to abandon a ship. Fortunately, however, he was not injured, nor did the incident dampen his enthusiasm for the sea.

Although none of his ancestors or relatives were sailors, Doyle has been interested in sailing ships since he was a youth. "I grew up in Seattle, and it sort of came naturally," he explains.

Doyle's initial experience with sail was aboard the full-rigged ship *Tusitala,* the last of the American commercial cargo sailing ships. In December, 1926, he signed aboard the *Tusitala* as an ordinary seaman. This vessel carried a total crew of 25, including 16 seamen forward in the fo'c'sle.. It was owned and operated by James A. Farrell, then president of U.S. Steel, who subsidized out of his own pocket the losses of $20,000 per year.

The journey of about a year took Doyle down the coast from Seattle, through the Panama Canal, on to Baltimore and New York, to Honolulu via the Canal and back to Seattle. At Baltimore, Doyle was promoted to AB (able-bodied) seaman. This speaks well for his aptitude when it is noted that although he had some prior experience with steam, this was his first venture as a working member of a sailing crew. And at the time of his promotion he was only 18 years old.

Although his interest in sailing never flagged, the next venture that is memorable to him occurred after World War II.

Doyle taught mathematics at Dartmouth College, Hanover, N.H., from 1945 to 1951, and among his students was one who owned a 42-foot ketch. During the summers of 1947 and 1948 he sailed with a group of Dartmouth students on cruises down the eastern coast of the United States. This ketch carried a crew of five students plus Doyle—all working crew members.

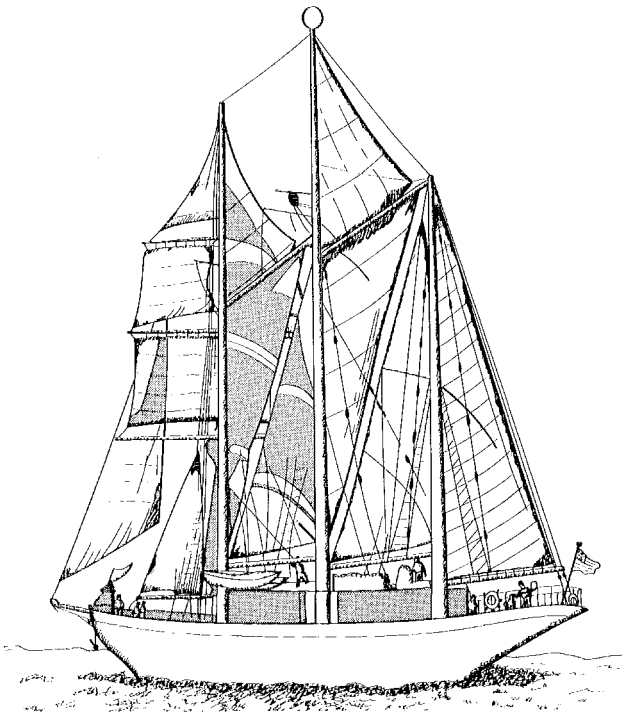
Tom later left Dartmouth for the Naval Research Laboratory in Washington, D.C., and joined LASL in 1955.

In December, 1964, he took a leave of absence from the Laboratory and sailed aboard the yacht *Patronilla*—a 47-foot cutter. "A small group of us sailed her from San Diego along the coast of Mexico and Central America and down to Panama where I left her and returned to Los Alamos," Doyle explained. "The rest sailed her through the Canal to Cartagena, Colombia, and then back."

It was shortly before this period that Doyle first became aware of Captain Christopher B. Sheldon—skipper of the *Verona*—who has navigated more than 125,000 miles under sail.

"Several years ago Sheldon operated the brigantine *Albatross,*" Tom said. "He would take a bunch of boys, primarily sons of the wealthy, on an 8- to

The yacht Verona was sketched by Bob Davis, D-3, from a brochure explaining the cruise. Photographs of the ship were not available.



10-month cruise. He would provide on-board formal education so the boys would not get behind in their school work. Sheldon has a doctorate in Spanish philosophy and literature from the University of Madrid, and he taught Spanish. His wife was an M.D. and taught zoology--which included first-hand information on the different varieties of sea-life they were able to catch. Other courses, such as English, were also taught."

Sheldon's wife died in 1960 when the *Albatross* sank in the Gulf of Mexico.

Although Doyle never made any of the cruises aboard the *Albatross,* he first became acquainted with Sheldon during this period and recognized the name when advertisements for the *Verona* appeared in "Yachting" and "National Geographic" magazines in 1964. These ads were for a cruise which began in July, 1965, and concluded almost a year later. During this period the yacht sailed almost around the world and wound up at Lisbon, Portugal.

The second voyage--which was also the last—began on July 15, 1966, from Lisbon. It was for this cruise that Doyle took a leave of absence and signed up as a crew member.

The *Verona* was a 131-foot barquentine owned by Sheldon. It had 8,500 square feet of sail, a 300 horsepower diesel for auxiliary power--enabling her to cruise at seven knots--and a displacement of 350 tons.

Since 1962 more than $300,000 was spent putting her in condition for world voyaging. She was virtually stripped down to her bare hull and rebuilt. Her accommodations were laid out to comfortably carry 32 persons with ample space for provisions—3,000 pounds of meats and other frozen foods and storage space for more than eight tons of canned and dry goods.

The crew and their duties and responsibilities aboard the *Verona* are best described by quoting the brochure issued before the cruise:

"The *Verona* normally carries a senior crew made up of Captain Christopher B. Sheldon, a first mate, a doctor, an engineer and a cook. All others are paying ($3,750 for this trip) crew members. As such, you will carry out all the tasks of a seaman. However, previous sailing experience is not necessary, since in this modern day and age one cannot even find professionals competent to handle large sailing vessels, and Captain Sheldon prefers to train you from scratch.

"At sea, you will stand two four-hour watches a day. During the daytime watch, you will not only sail the ship but carry out all general maintenance jobs such as sanding and painting. During the night watch no work other than sailing the vessel will be performed, and often you will be able to sleep on deck where you will be 'on call.' In port, formal watches are not maintained, and you will have the maximum free time ashore that is possible."

On this last cruise, the surgeon was also a crewmember who used his medical skills when they were required.

Before sailing from Lisbon, the skipper named two of the paying crew members as "watch mates" to

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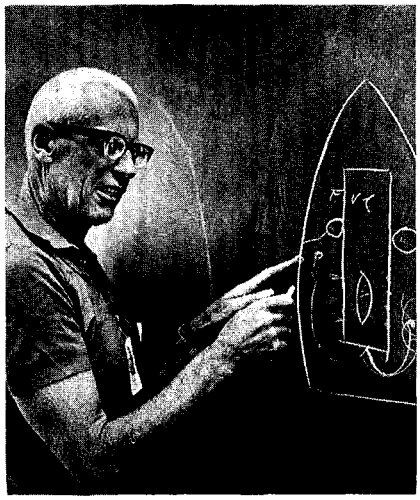
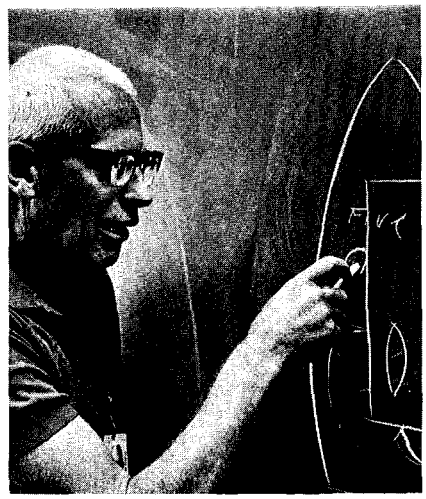
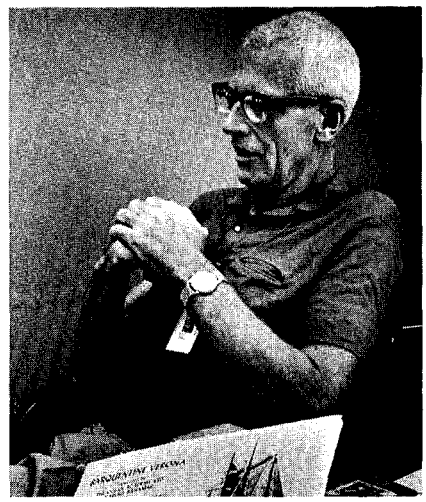


"We tried to get the dinghy over the side here, but the rail was too high. . ."



"The two rubber life rafts were located forward. . ."



"The lifeboats were on the boat deck, directly above the fire . . ."

Sailing Scientist . . .

Continued from preceding page

assist his one professional mate. Doyle was one of those picked. A watch mate was in charge of a four-hour watch, made sure the craft maintained course and the proper sails were up, and issued necessary orders to the crew members on that watch.

On the voyage there were normally about 25 persons aboard at any one time, although some left early and others came aboard late.

"One of the roughest parts of the voyage was the first night out of Lisbon," Tom said, "when the ship struck the 'Portugese Trades' with their high winds and rough seas. This was quite a shakedown for the new people who had never sailed before, and many of this green crew got seasick.

"However, even though it was a green crew, by the end nearly everyone had got their sea legs and were good sailors."

The itinerary for the voyage of more than 20,000 miles included a number of stops in the Mediterranean, then through the Suez Canal to the Seychelles Islands (the highlight of the trip for Doyle), down the eastern coast of Africa, around the Cape of Good Hope and up the west coast of Africa, across the Atlantic Ocean to Barbados, then to Bermuda and finally docking in New York or Connecticut "on Monday, May 29, 1967," according to the brochure explaining the trip.

But the voyage got only as far as Africa's west coast before fire—the worst disaster that can befall a ship at sea—struck.

The *Verona* had arrived at the city of Santa Isabel on the island of Fernando Po, off the west coast of Africa, on the morning of Sunday, Feb. 19. After three days in port, she sailed at 5 p.m. Tuesday, Feb. 21, bound for Lagos on the African continent—a distance of about 450 miles.

But at 7 p.m., when the *Verona* was about nine miles off-shore, fire was discovered coming out of the engine room. The ship was abandoned only 30 minutes later, after all attempts to save her failed.

"At the time of the fire the ship was under power with no sail," Doyle said. "I was in my bunk resting because I was scheduled to take over the next watch in about an hour.

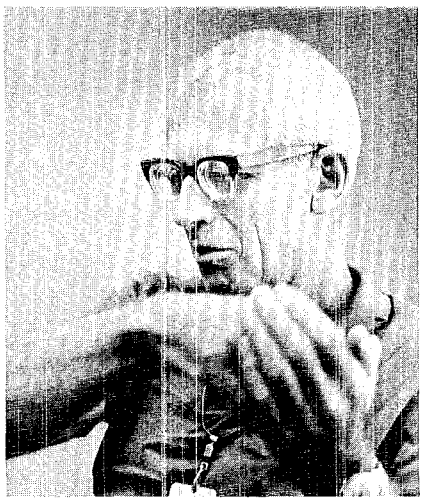
"When I heard the call of 'fire' I ran on deck and saw the skipper fighting the fire in the engine room with CO_2 cylinders. He extinguished the fire about three times but it would flare up again. Presumably diesel oil was leaking on hot metal plates and the CO_2 was just smothering the flames but not affecting the heat, so the fire would start up again. Water was needed to cool the metal down.

"There was a great deal of confusion, but another fellow and I started hauling water up over the side to try to quench the fire. But the little water we could get in the buckets was not enough, so I tried to fill a big garbage pail with water. However, the fire became so intense so quickly we could see this wouldn't work, so we gave up on this.

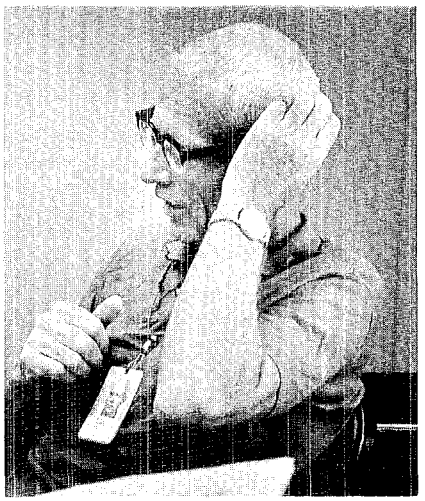
"There was a very rapid increase in the intensity of the fire, and it was obvious the fire was not going to be put under control because we did not have the proper equipment."

The *Verona* had a number of boats, and the main effort soon became concentrated in trying to get these over the side.

First, there was a "long boat" with a sail which was stocked with provisions that would be needed in



"We tried to haul water up over the side of the ship. . ."



"There was so much confusion the details are a little hazy. . ."

"Sure, I'm still enthusiastic about sailing. . ."

the middle of the ocean if the vessel had to be abandoned. There also were three skiffs with outboard motors used by the crew to cruise around a bay while in port, as well as a launch, a sailing dinghy for pleasure use and two rubber life rafts which would have probably held 20 men each.

"All of these except the dinghy and the rafts were aboard the boat deck directly over the fire, and we couldn't get to them to release them," Doyle explained. "A bunch of us tried to get a dinghy over the side, but couldn't, so we maneuvered the rafts to the stern, ready for the skipper's order to abandon ship —which came shortly.

"We had a radio aboard, and I heard the key working so I'm sure it was being used, but we were in sight of shore and the flames were very apparent to all those watching."

Two Spanish naval ships were in port, and one sent a whaleboat to assist the *Verona's* crew. It got to the area after the vessel was abandoned, as did some local fishing boats. The fishermen picked up the crew and rafts and brought all to shore.

"Four men were burned while fighting the fire and were hospitalized," Doyle said. "One of these men was released the next day, although the other three were to remain in the hospital for about a week.

"After we got ashore we were taken to the same hotel where we had been having a good time just a few hours before, prior to our sailing. Only this time we had no money and no clothes except what we had on.

"The people were very hospitable, though. The hotel manager rummaged through his old clothes bag and got us something to wear and put some of us up in his vacant rooms. He also made arrangements for the others to be taken to another hotel which also had some vacant rooms.

"The quality of the meals did not change a bit from when we were paying. However, the captain had arranged to have us fed on his credit so we cut down on the luxuries because we didn't want to spend any more of his money than we had to. We got back to the hotel about midnight."

There was the utmost cooperation on the part of of the port authorities, Tom emphasized.

"We had lost our immunization records, naturally, and needed proof of our yellow fever and smallpox shots before we could leave the island. So the local health department gave us all shots and yellow international shot cards. However, five of the crew could not be found for their shots. The plane was to take off Friday for Madrid, and these five had to have their shots by 1 p.m. Thursday or they wouldn't be permitted to leave. Luckily we managed to round them all up in time—some were in town shopping, and some were just walking around on the streets."

The travel agent for Iberian Airlines notified the American Embassy and Iberian officials of the crew's plight, and the airline gave them free transportation from Fernando Po to Madrid.

"We got to Madrid about 10:30 p.m. Friday and left Saturday at 1 p.m. for New York," Doyle said.

After an experience like this, is he still as enthusiastic about sailing?

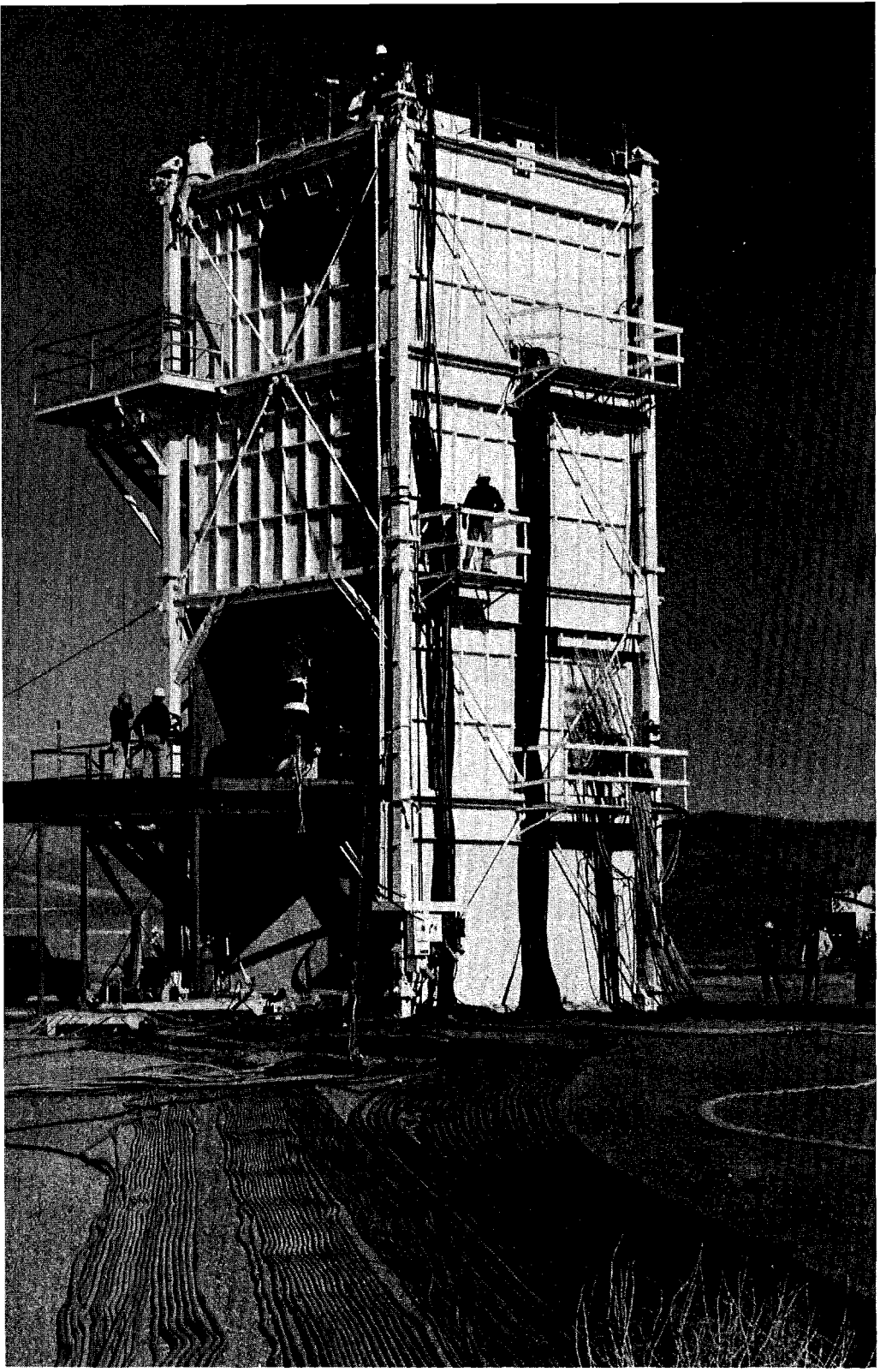
"Sure."

What did he miss most of all while he was on the cruise?

Ice cream.

"Thinking of ice cream used to torture me. I would think of a place in Los Alamos where you could buy all the cones you wanted if you had the money. And here I had money but no cones."

Mathematics, sailing and ice cream—his three great loves.



Neutrons traveling up Persimmon shaft were used in experiments housed on all four levels of the tower. Literally miles of cables connect the experiments to monitoring equipment (facing page) beyond the predicted edge of the subsidence crater.

PERSIMMON, third in the current series of underground neutron physics experiments conducted by Los Alamos Scientific Laboratory scientists, was detonated late last month in the Nevada desert. Persimmon took on an international character with a group of British scientists participating in one part of the test.

Conducted in conjunction with underground weapons tests, these physics experiments utilize the intense neutron sources produced by the nuclear explosions, giving scientists information they need for both reactor and weapons improvements. In addition, basic physics research can be tied in with these tests.

Knowledge of neutron reaction probabilities – "cross sections" – is particularly important in the design of nuclear reactors and other nuclear devices, since detailed examination of the variations in these probabilities leads to a better understanding of nuclear interactions.

To obtain more data on cross sections, the underground explosions conducted at the Nevada Test Site are much more satisfactory than laboratory experiments, since the neutron intensity in a nuclear explosion is billions of times greater than can be produced in laboratory accelerators or reac-

Persimmon:

New Data From A Hole in the Ground

tors. Using the underground explosions, scientists can also measure the nuclear properties of reactor products whose radioactivity is too great for measurement in the laboratory.

The enormous neutron intensity from the nuclear explosion also produces neutron-induced reactions in a sample at a much greater rate than the radiations resulting from the radioactivity of the sample. As a result, measurements can now be made to determine the nuclear properties of some of the most important reactor poisons, or neutron absorbers, such as the very radioactive fission product promethium 147.

The nuclear explosion technique has proved to be quite versatile, and an enormous energy range can be covered. Neutrons are produced almost simultaneously by the explosion and are sorted out according to velocity as they travel up the vacuum pipe. The most energetic neutrons arrive first, the slower ones later. Therefore the time at which nuclear reactions occur in the experimental areas at the ground surface determines the energy of the neutrons producing the reactions. In this manner measurements are made from a few electron volts to several million electron volts.

Since several beams of neutrons can be obtained from one nuclear explosion and many experiments can be performed on one beam, a very large amount of new information can be obtained from a single explosion.

For the Persimmon event, the nuclear explosive was positioned about 1000 feet underground. An evacuated pipe from the device to just below the tower on the surface at "ground zero" provided an unobstructed path for the neutrons. Just below the tower the main neutron beam was divided into four separate beams, giving each floor of the tower its own neutron source in an evacuated pipe. Willard Dudgeon, J-7, was in charge of the design and alignment of the main beam.

Directly above the beam splitter on the ground floor of the tower an experiment called the "neutron wheel" was installed by a J-11 team directed by George Cowan to measure the relative abundance of the fission products produced in uranium 233 by neutrons of various energies. A target of U-233 was mounted on a horizontal wheel two feet in diameter spinning at 5000 rpm; the edge of the wheel was moving at a velocity of over 300 mph. During the test, neu-

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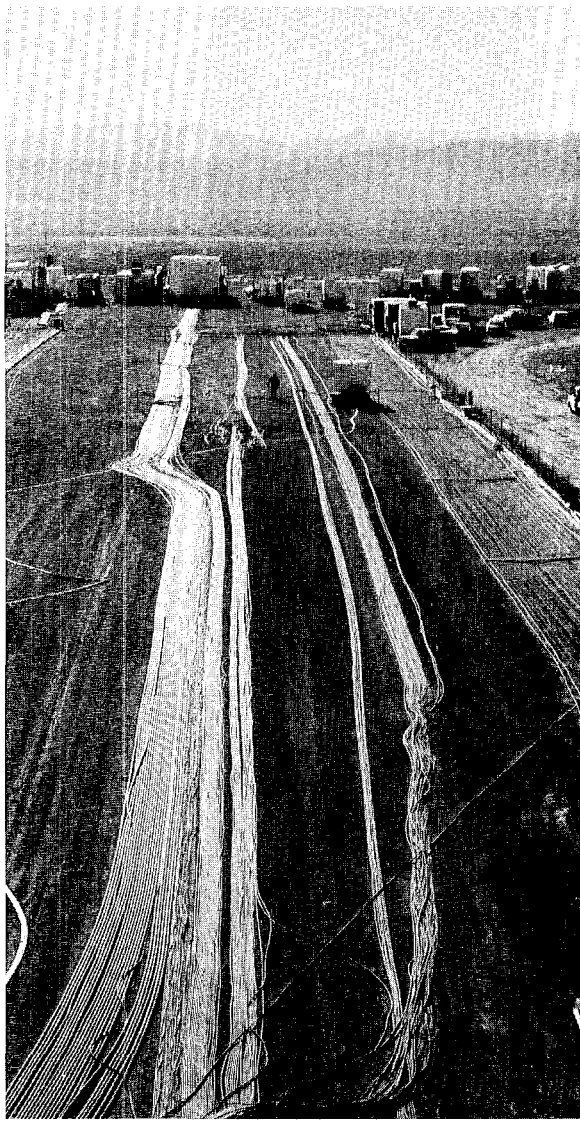
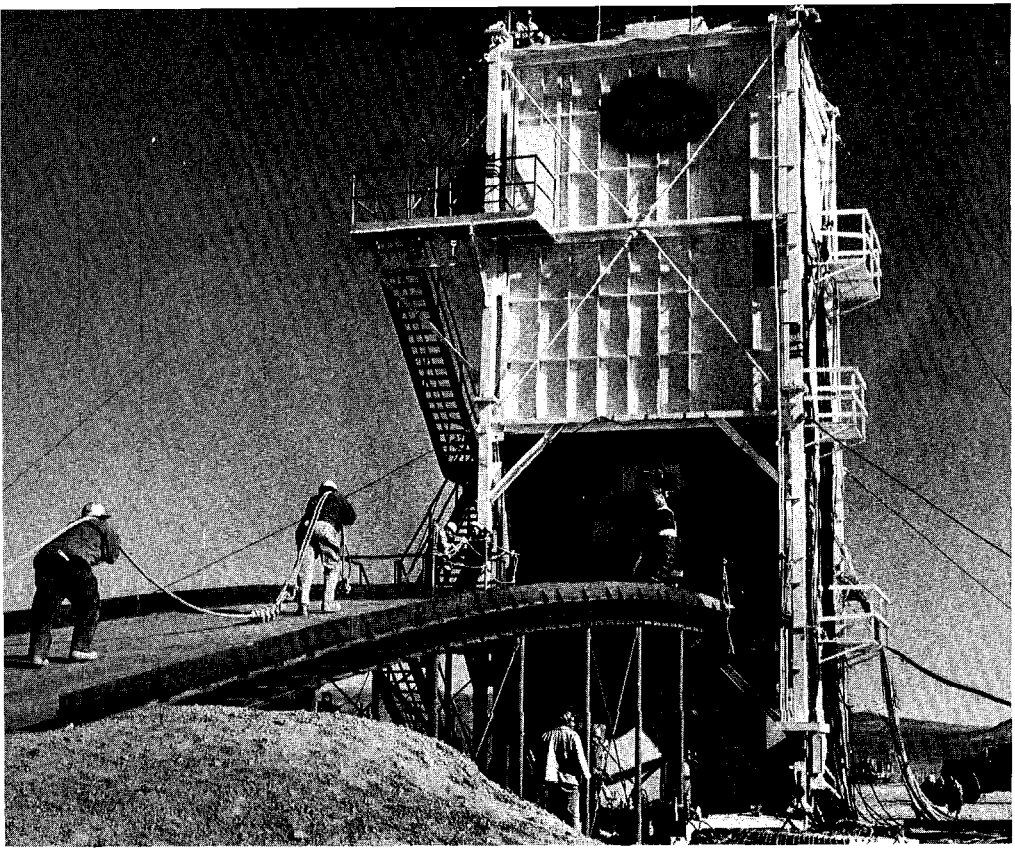


At opposite end of cables, oscilloscopes, cameras and other monitoring equipment gather valuable information that would be difficult to obtain in the laboratory.



Workmen drag cables up the ramp to the second floor experiments, where they will be attached to a "sled" that can be pulled out of the tower before the subsidence crater begins to form.

Persimmon . . .

Continued from preceding page

trons passed through a narrow slit onto the moving U-233 target at different times—depending on their energy—to produce distinct bands of fission products, each of which was produced by neutrons of a specific energy.

The bands of radioactive fission products were located by autoradiographing the target with x-ray film. The radioactivity from fission-product bands exposed the x-ray film to produce a black line on the developed film. Then, using the autoradiograph as a guide, the radioactive bands were cut out of the target. The bands were dissolved, and the mass distribution of the fission products was determined by standard radiochemical separation and counting techniques to determine how the fission product mass distribution varies with the energy of the neutrons producing the fissions.

The second floor of the tower housed a set of experiments to measure the neutron fission cross sections of plutonium 238, uranium 235, americium 243 and curium 244 and the neutron capture cross sections for promethium 147 and plutonium 238.

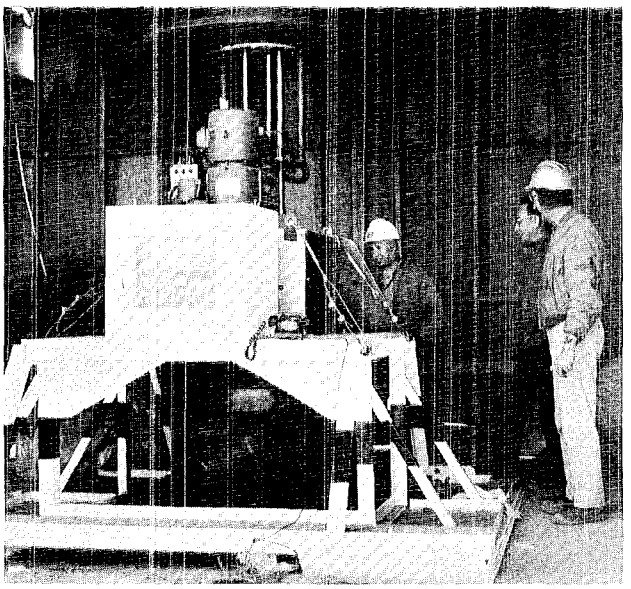
These experiments were a cooperative effort by personnel from P and W divisions, the Idaho Nuclear Corporation at the National Reactor Testing Station in Idaho and the Aldermaston Laboratory in England.

The P division team, which included people from P-DO, P-3 and P-9, was led by Ben Diven, assistant division leader. Al Ellis of P-3 designed much of the experimental equipment. The W Division efforts were supervised by Art Hemmendinger, W-8 group leader. Jim McNally, W-8, was in charge of the operation of the recording station for the second floor experiments.

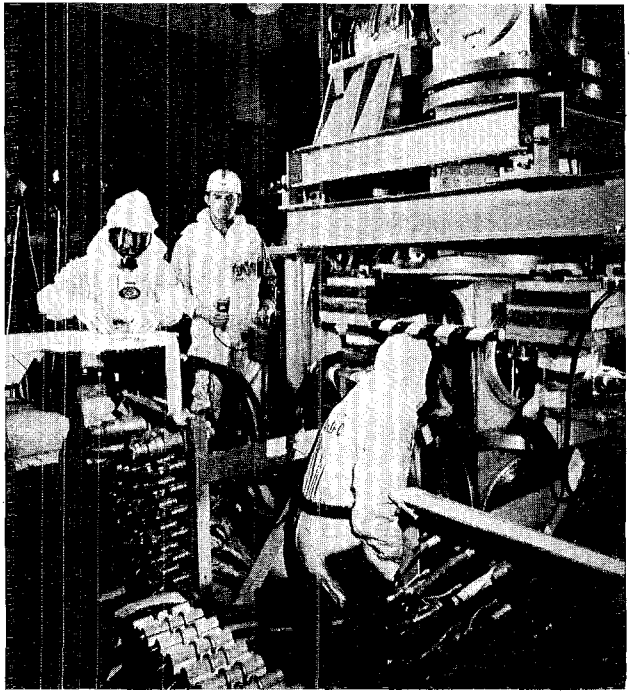
Within seconds after the explosion, the detectors and auxiliary testing apparatus, mounted on a sled, were pulled out of the tower and down a ramp to avoid damage to the equipment during the formation of the subsidence crater.

Thin target foils were exposed to the neutrons, and the fission cross sections were measured through detection of fission fragments in solid state charged particle detectors. The fission fragments generate in the detector a current proportional to the reaction rate, and their current signal was transmitted to remote oscilloscopes where it was recorded by high speed cameras. A total of 66 detectors were placed at angles of 15, 55 and 90 degrees from the neutron beam path. Camera shutters, which were opened one second before the explosion, protected certain detectors from the intense alpha radiation from some of the target foils.

The neutron capture reaction is one in which a neutron is absorbed by a nucleus which later emits a



Willard Dudgeon, J-7, left, George Cowan, J-11, and William Frankowski, J-7, check alignment of wheel over main neutron beam at base of tower.



Ben Diven and Al Ellis, P-3, in protective clothing and masks, insert radioactive samples in vacuum chamber as radiation safety monitor Ervon R. Koenig stand by.

gamma ray. The capture reaction rate was measured by conversion of a fraction of the gamma rays to recoil electrons which were detected by solid state detectors identical to those used for fission measurements.

The intensity of the neutron beam was established by the use of samples of lithium 6 whose cross sections are very precisely known. The calibrated beam intensity and observed reaction rates provided the measurement of the unknown fission and capture cross sections.

The promethium 147 sample, because of its extreme radioactivity, was housed in a lead container until 15 seconds before the explosion when it was automatically placed in position. The lead shield protected workers and detectors from the intense radiation produced by the promethium 147. The sample handling equipment was built at the National Reactor Testing Station in Idaho where the promethium 147 sample was prepared.

In order to handle the detector output currents that range from a ten-thousandth of an ampere to one ampere, LASL scientists designed special five-decade logarithmic amplifiers. They cover the range from zero to one millivolt (1/1000 volt) as an almost linear amplifier. From ten millivolts to 100 volts, their response is logarithmic, allowing signals from one millivolt to 100 volts to be read with one oscilloscope sensitivity setting.

The amplified detector signals were transmitted by cables to the oscilloscopes housed in an instrumentation trailer located beyond the expected edge of the subsidence crater. A photographic record of the signal amplitude, which is proportional to the reaction rate of the sample, provided an efficient means of data recording and storage.

To cover the flight time of the neutrons--which ranged in energy from ten million to ten electron volts--from the device to the experiment, data was recorded for about ten thousandths of a second, and early data had a resolution time of one 10-millionth of a second. This was accomplished by the use of still cameras covering only a few millionths of a second and by high speed drum cameras and moving film streak cameras operating at a film speed of 100 feet per second while photographing oscilloscopes with cathode ray tubes coated with very fast decaying phosphors.

The experiment on the third floor, a J-16 effort under the supervision of J-16 leader Neel Glass, measured neutron capture in europium 151, europium 153, lutetium 175 and niobium 93. These samples, mounted inside the neutron beam pipe, were accompanied by six lithium 6 samples to meas-

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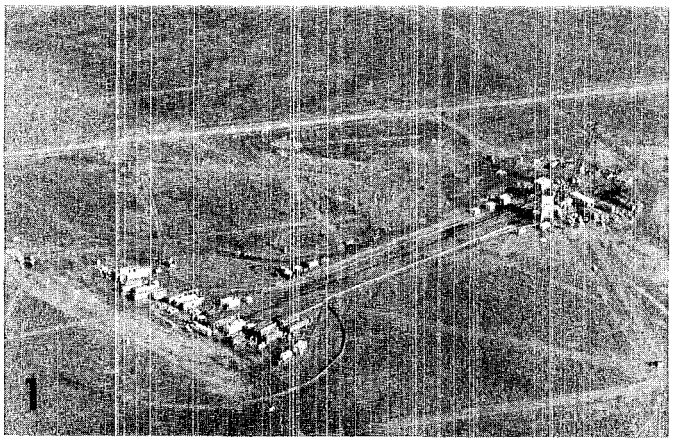
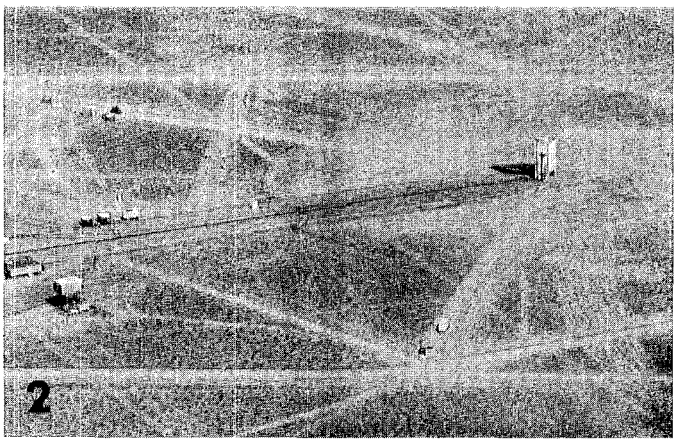
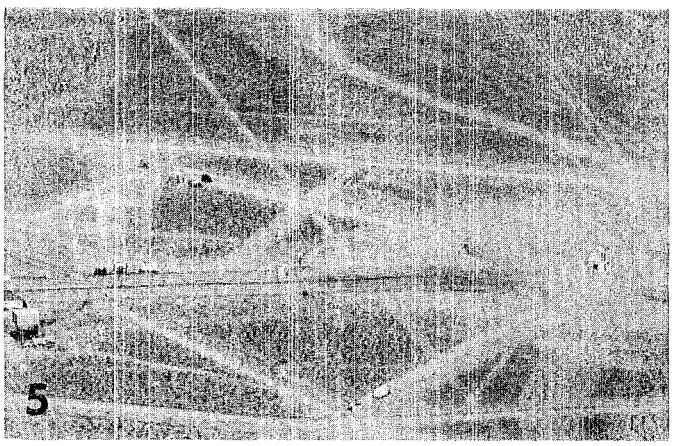
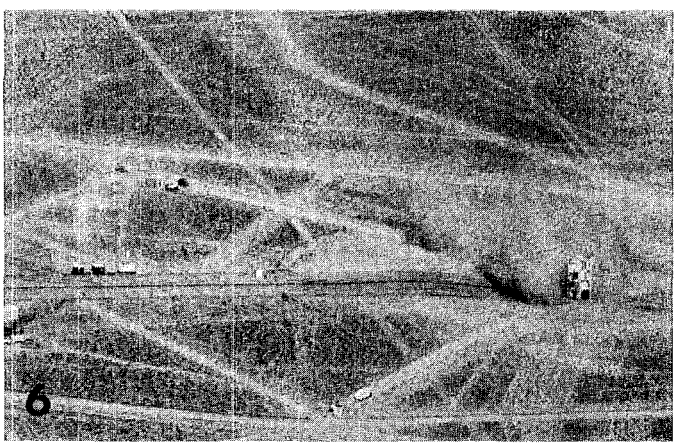




For several weeks before the test (photo 1), the area around the Persimmon hole—right edge of photo—was crowded with workmen and equipment. Monitoring equipment is housed in trailers several yards away—left—and connected by cables to the experiments in the tower. Photos 2 through 8 show "ground zero" as the subsidence crater formed; photos cover approximately four minutes' time. Cratering started (photo 2) about six minutes after Persimmon was detonated. By this time, experiments housed in the tower had been pulled down





Persimmon . . .

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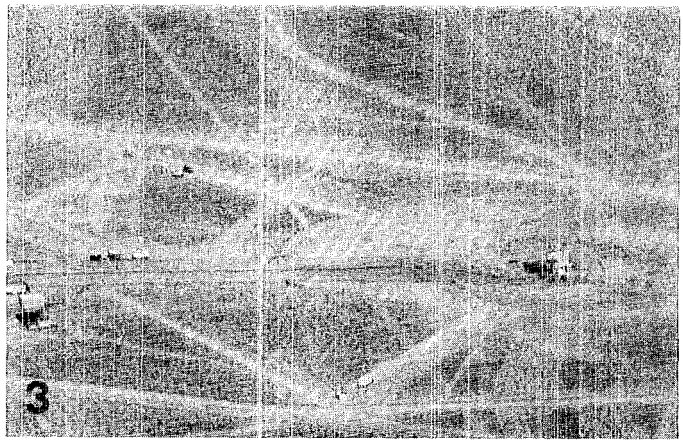
ure the neutron beam intensity and an yttrium sample to measure the neutron background.

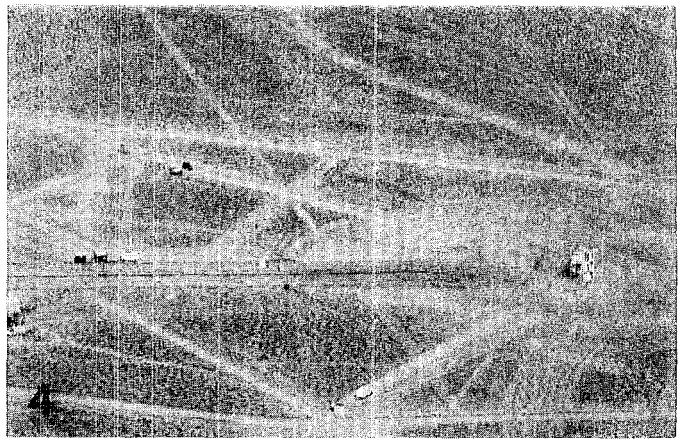
A total of 21 detectors observed these samples, and their amplified signals were read out on scopes and recorded photographically as with the other samples.

On the fourth floor, an experiment by a J-12 team led by Lee Aamodt, J-12 group leader, measured the neutron scattering properties of samples of thorium 232 and bismuth 209 placed in the beam pipe. Aluminum "windows" allowed the scattered neutrons to be recorded by 18 detectors located at various angles and distances from the samples. The different angles help to identify the energies of the scattered neutrons since scattering angle is a function of neutron energy, and the different distances allowed gamma rays to be distinguished from the relatively slow neutrons.

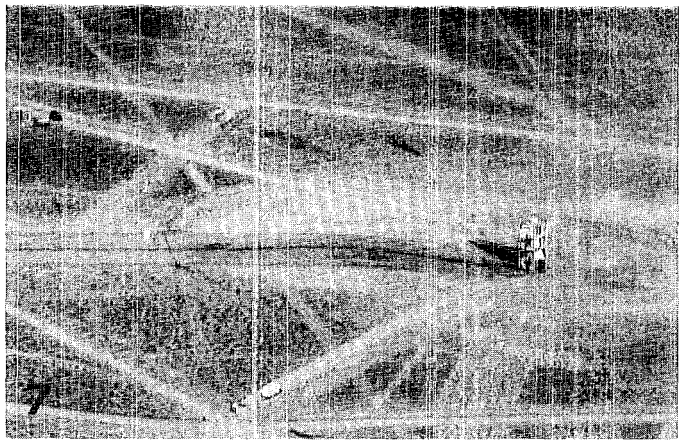
The detectors, recently developed at LASL, are considerably more efficient in the detection of neutrons than those previously used because of their relative insensitivity to gamma rays. In the detector, a scattered neutron enters a cell filled with helium 3 at a pressure of 3500 pounds per square inch. When a neutron strikes a helium 3 atom, nearly one million electron volts of energy are released, producing a pulse of light. This light pulse is converted to an electrical pulse and is greatly amplified by a photomultiplier. This amplified signal is then sent to the instrumentation complex where it is read by an oscilloscope and photographed.

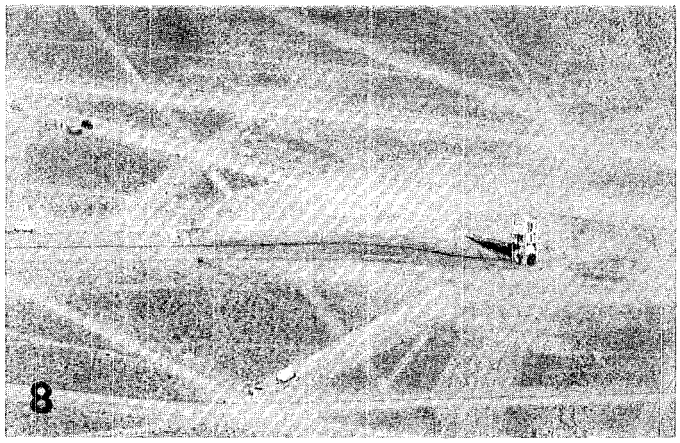
On the roof of the tower were gamma ray detectors which determined when the first gamma rays, which precede the neutrons up the beam pipe, had arrived and provided a signal to start the recording systems and auxiliary equipment for the second and third floor experiments.



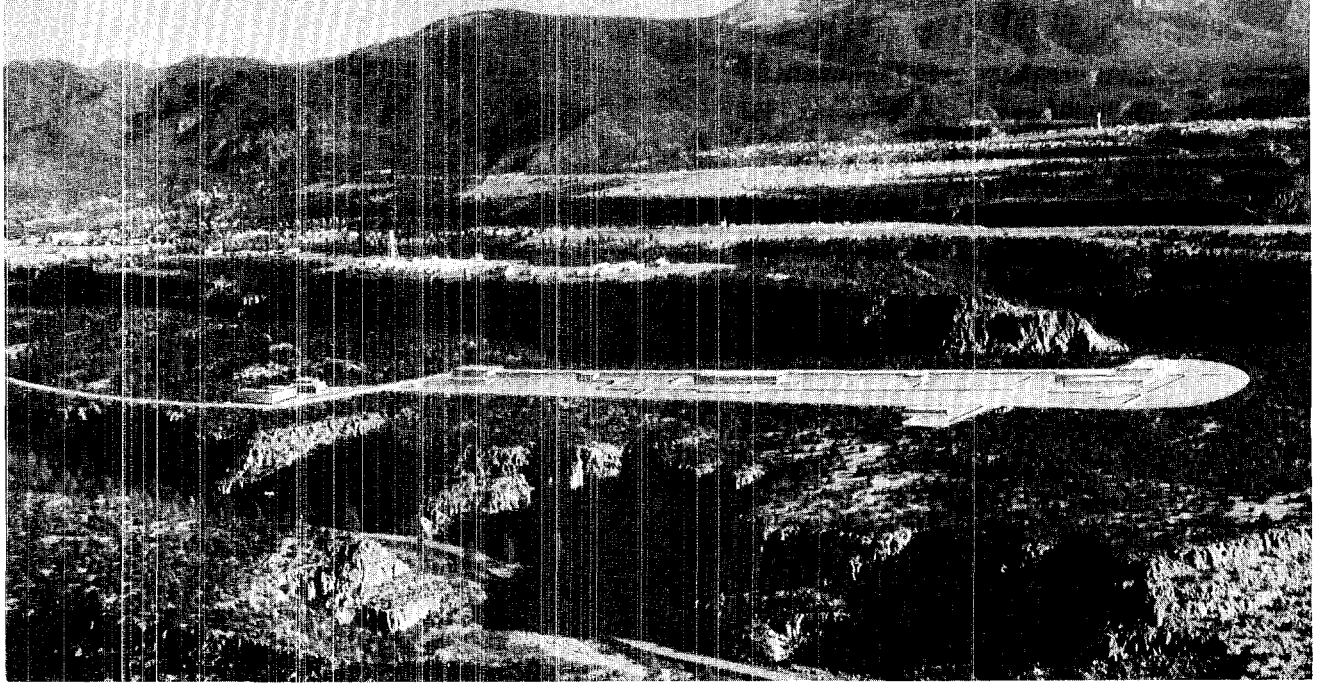


ramps and beyond crater's edge. The W-8/P-3 experiments were moved to shed in upper left, the British experiment to trailer in right foreground. As tower sinks into center of crater, cloud of dust forms, then disappears as cratering ceases. Time lapse between photos 3 and 6 is less than a minute. In photo 7, sampling plane makes a pass over the area. Photo 8 shows Persimmon tower four minutes later and about 25 feet lower than before the test. PUB's Bill Jack Rodgers took this photo series from a hovering helicopter.





Persimmon, in background, added one more crater to the desert scene at the Nevada Test Site.



Artist's drawing superimposed on aerial photograph of Los Alamos shows layout of meson factory on Mesita de Los Alamos.

LASL Projects Named in Budget Message

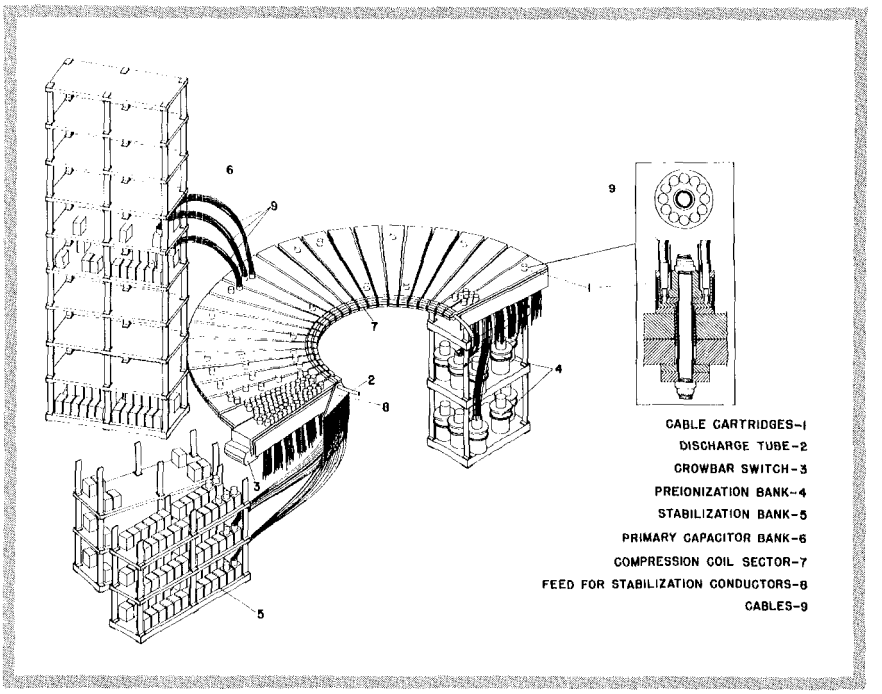
A GIANT STRIDE down a long road was taken by the Los Alamos Scientific Laboratory on Feb. 28, but it had help in high places.

On that day President Johnson submitted an amended budget message to Congress in which he asked that $50.3 million be appropriated during the fiscal year beginning next July to construct a "meson factory," and $8.5 million for a Scyllac machine, both at Los Alamos. While the President's request must still be approved by Congress, Administration support is expected to bring these facilities to reality.

First conceived in 1962, the meson factory will be a variable energy 800 million electron volt proton accelerator which will provide a beam current of one milliamp, an external beam current more than a thousand times higher than that of any existing accelerator of comparable output energy. It is called a "meson factory" because from the interaction of its primary proton beam with suitable targets will emerge beams of pi mesons thousands of times more intense than those now available. Pi mesons are short-lived particles which decay into muons and neutrinos after about a hundred-millionth of a second. These secondary beams, together with the primary proton beam and neutron beams which will also be produced, will be used to study the atom nucleus in ways not now possible.

An 800 MeV proton has a feature particularly valuable in studying nuclear structure. To discover the structure of something too small to be seen, a tiny probe of some kind must be used. Light waves are convenient for objects down to 10^{-4} centimeter

Cutaway drawing shows some of the components of Scyllac. Scientists believe toroidal shape of magnetic field will successfully avoid "end loss" experienced in earlier Scylla containment experiments.



(.0001), using a microscope. X rays will take one down to 10^{-8} cm, but that is still 10,000 times larger than most nuclei, so an even shorter wavelength is necessary. Short wavelength probes can be produced by accelerating protons to high energies; a 10 MeV proton has a wavelength of about 10^{-12} cm, but that is still too large. An 800 MeV proton approaches a wavelength of 10^{-13} cm, which is about the right size for studying the detailed structure of most nuclei.

Negative pi mesons have a unique property which greatly intrigues medical researchers. Upon being captured by a nucleus, they blow up their host and release quantities of energy in the form of heat. This peculiar feature holds the promise of being a useful tool in clinical medicine, particularly in the possible destruction of inoperable tumors without damage to surrounding healthy tissue.

Once funds for the meson facility are approved by Congress, construction is expected to be completed about late 1971. It will be located on Mesita de los Alamos between the South Mesa access road and DP site. When completed, about 200 people will be employed on the permanent staff of MP division, although many visiting scientists from universities and research centers throughout the country will also use the accelerator.

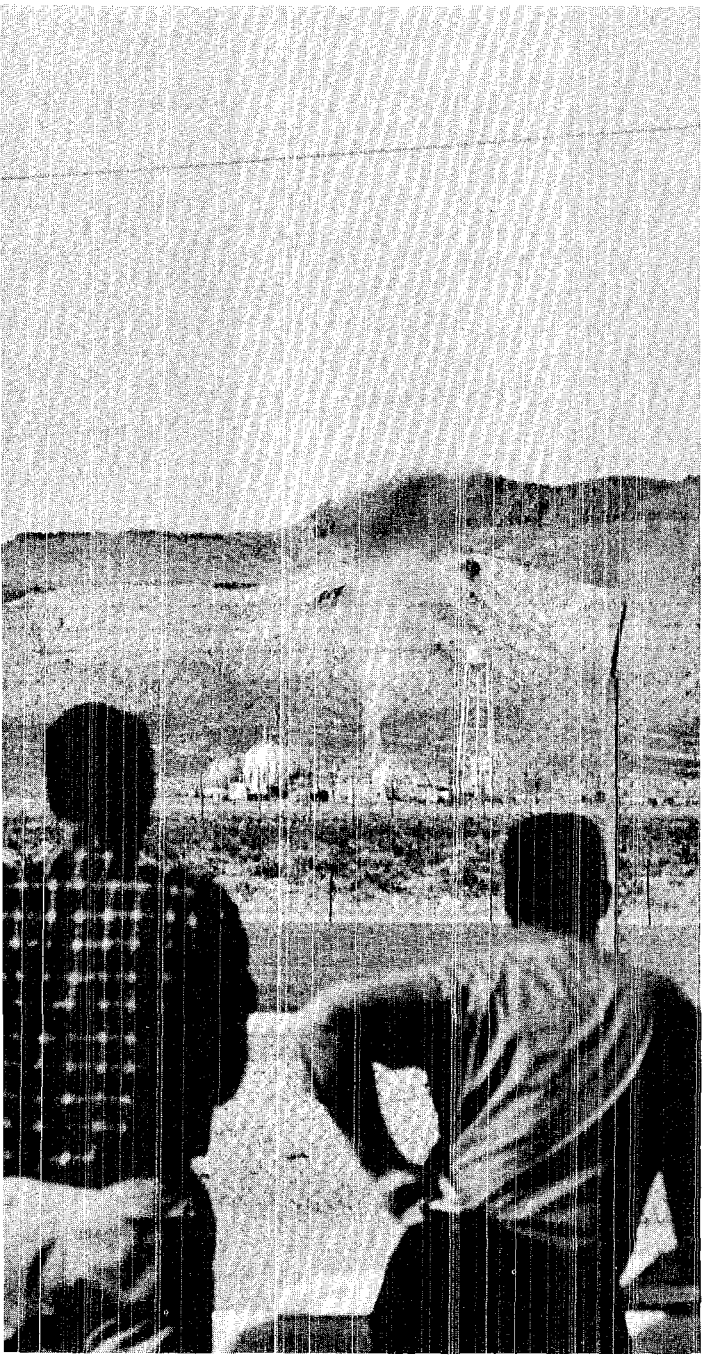
Scyllac is planned as a new Project Sherwood containment experiment at LASL. An extension of previous "Scylla" experiments which were conducted to study containment of thermonuclear plasmas in a magnetic field, Scyllac ("Scylla–closed") will first be a 15-meter-long tube, later rebuilt in toroidal shape about 15 meters in circumference. By utilizing a capacitor bank of 14-megajoule storage capacity, its designers hope to be able to raise the temperature of plasmas to several tens of millions of degrees centigrade and to increase by a factor of ten the confinement time of the hot plasma to tens of microseconds. The toroidal shape may help solve the problems of "end loss," which have limited previous linear Scylla machines and to give scientists a better understanding of long-term stabilities in plasmas.

If it is approved by Congress, a 28,000-square-foot addition to the present Sherwood Wing will be built to house Scyllac. Construction of the building and machine will require about three years.

Project Rover was also strongly supported in the President's request to Congress. About $90 million is expected to be spent primarily by industrial contractors under the supervision of the joint AEC-NASA Space Nuclear Propulsion Office as part of the billion dollar program to develop and build a nuclear rocket engine during the next decade.

The Administration's decision to proceed with industrial contractor development of a flight engine emphasizes the importance of research and development done by LASL, for the nuclear engine will be based on the vast body of nuclear propulsion technology being accumulated as a result of the LASL-designed Kiwi and Phoebus reactors.

The long-range future of LASL and its reputation as one of the nation's most important research centers were greatly enhanced by the good news of Feb. 28.

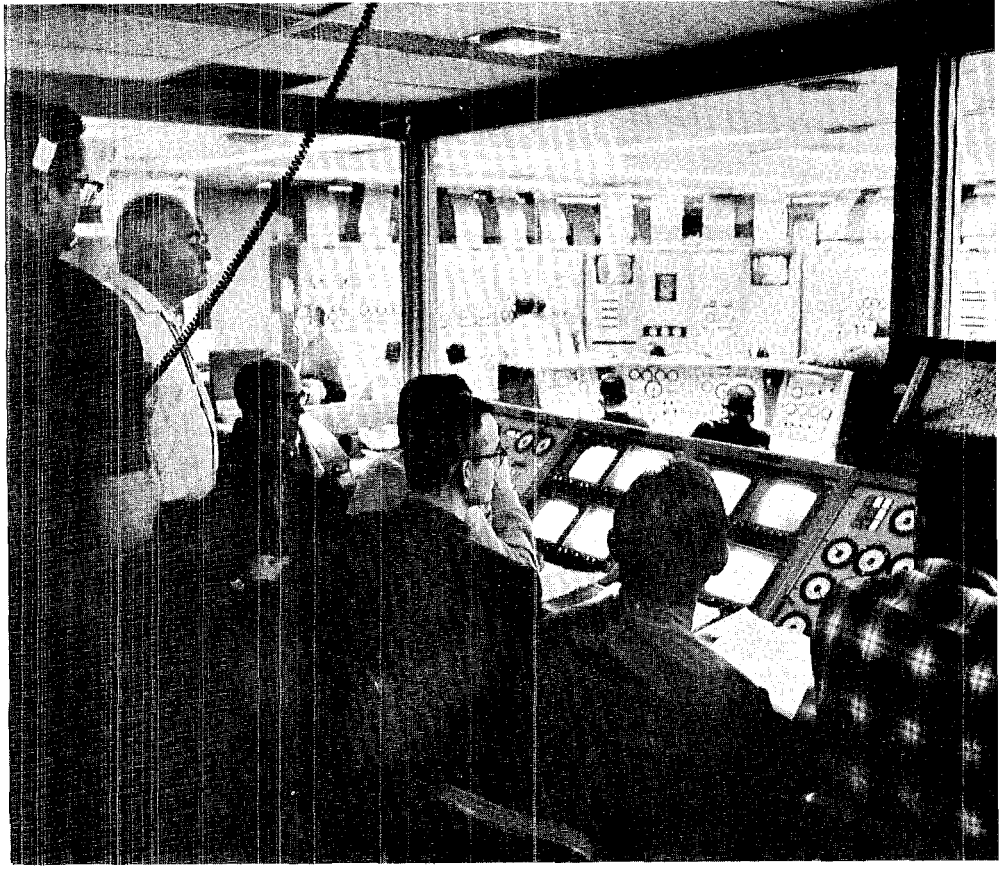


From Control Point more than two miles from Test Cell C, LASL employes watch Phoebus 1B as it goes into full power phase.

Phoebus 1B: A Good Performance

VERY MUCH PLEASED with preliminary data from an "almost ideal" full power Phoebus reactor run, LASL scientists have begun the weeks-long task of conducting a detailed analysis of almost every inch of the reactor.

Phoebus 1B, second of the Phoebus series in Project Rover, was tested at full power at the Nuclear Rocket Development Station at the Nevada Test Site Feb. 23. It was a record run in both duration and power level, nearly tripling the run time of Phoebus 1A, the last reactor tested. Phoebus 1B ran at full power for the planned duration of 30 minutes, with power averaging just under 1400 megawatts and peaking very close to



From test monitor room overlooking main control room, Jim Henshall, left, Phoebus 1B test group leader, and Keith Boyer, project director, also standing, can keep track of every detail of the reactor run.

the design target of 1500 megawatts and a fuel element exit temperature near 4500°R. The first reactor in the Rover program, Kiwi A, tested in 1959, had an operating power level of only 100 megawatts.

Phoebus 1B performed well in other aspects, too, with only seven weeks elapsing between the time it arrived at the test cell and the time it returned to the R-MAD building for disassembly following the run. During this time, 1B underwent three preliminary runs prior to the full power run.

On Feb. 28, Phoebus 1B was brought back to the R-MAD (Reactor Maintenance, Assembly and Disassembly) building. For the next several weeks, LASL scientists—using remote-control manipulators and protected by seven-foot-thick walls and windows—will be taking the reactor apart piece by piece for careful study.

Next LASL reactor scheduled for testing in the Rover program will be Phoebus 2A, a giant-sized reactor of the type that will be incorporated into the nuclear rocket engine destined for use in exploring other planets.

"Cold flow" tests on Phoebus 2A are tentatively set for sometime this summer, with the full power Phoebus 2A run expected to take place late this year or in early 1968.

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Panels lining main control room get scientists' complete attention as Phoebus 1B starts its full power run. Television monitors give visual picture of reactor's status.

Seldom seated during a reactor run, test leader Jim Henshall listens on headset as he checks panels operated by Don Liebenburg, CMF-9; Murlin Nutter, J-18; Frank Durham, alternate N division leader; and Charles Fenstermacher, J-18 group leader. Keith Boyer, standing, background, is project director.

Phoebus 1B . . .

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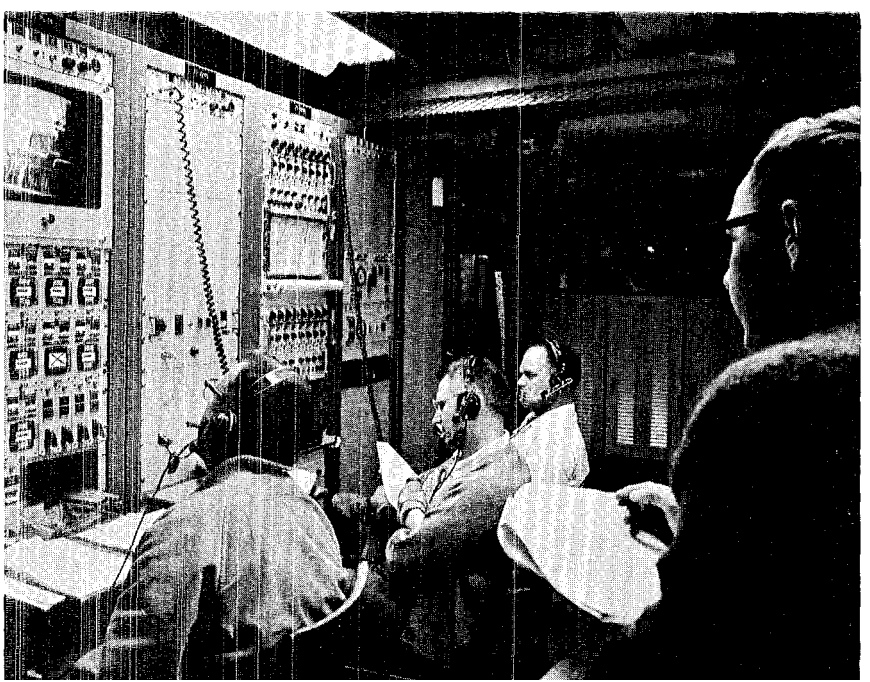
Robert PerLee, left, D-8 associate group leader, operates panel controlling movie and still cameras that photograph Phoebus 1B from remote bunkers and towers. John McCloud, right, D-10, checks run time for sequencing cameras. At left center Harley Lane, J-5, operates controls to sample reactor effluent as Ralph Coady, J-5/NTO, observes operations for later NERVA tests.



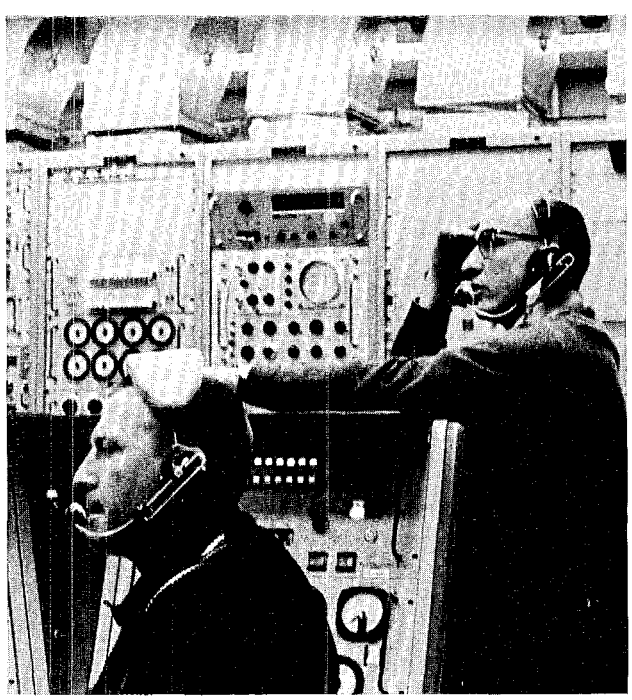
Flicker of a smile crosses Phoebus test leader Jim Henshall's face as Phoebus 1B reaches full operating power, though both he and project director Keith Boyer, standing right, keep a sharp watch on control panels.

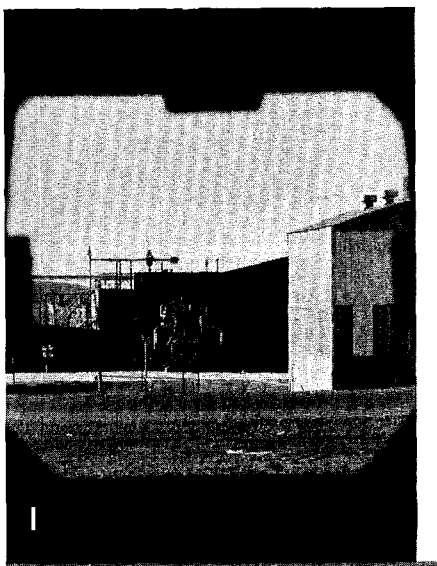
Television screen in crowded office outside control room gets avid attention—and happy looks—as Phoebus 1B goes through a near-perfect performance.

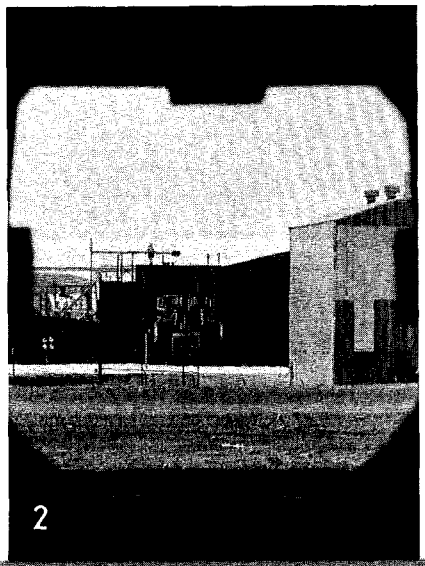
continued on next page

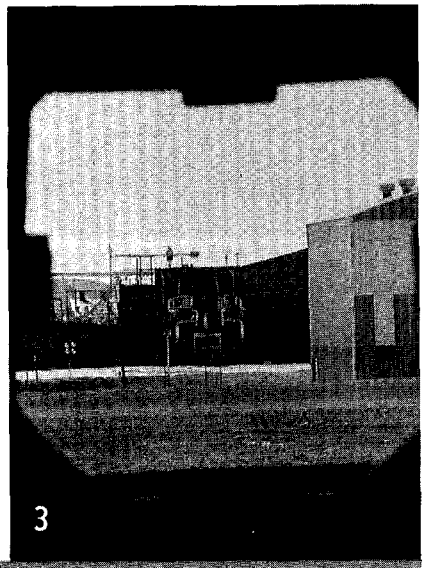
Meanwhile, back in Los Alamos, LASL Director Norris Bradbury and Technical Associate Director Raemer Schreiber were all smiles after hearing Phoebus run on communications set-up linking control room at NRDS with conference room in Administration building in Los Alamos.

Weary after hours at the control panels, Ed Logan, left, chief test operator, and John Rink, alternate test group leader, watch as reactor goes into "chill-down" following full power run.









Phoebus Returns to R-MAD...

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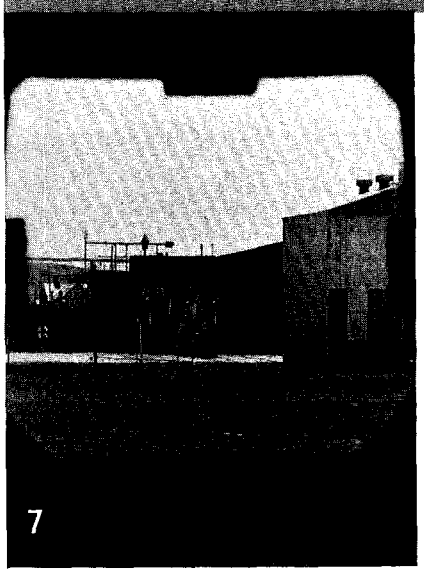
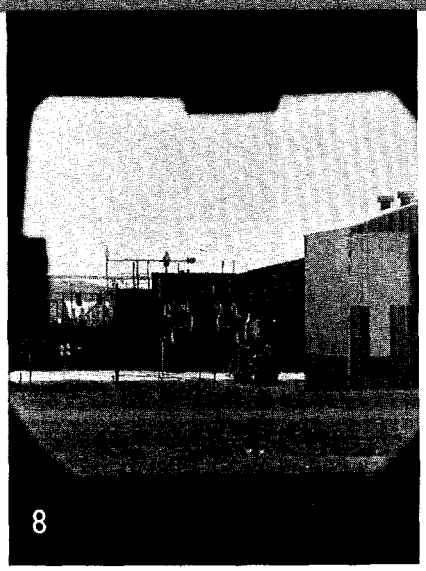
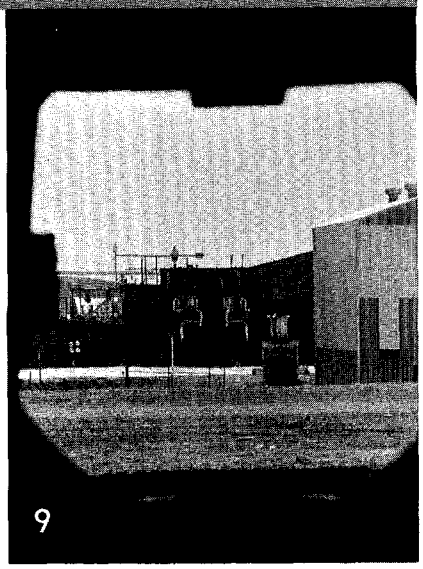
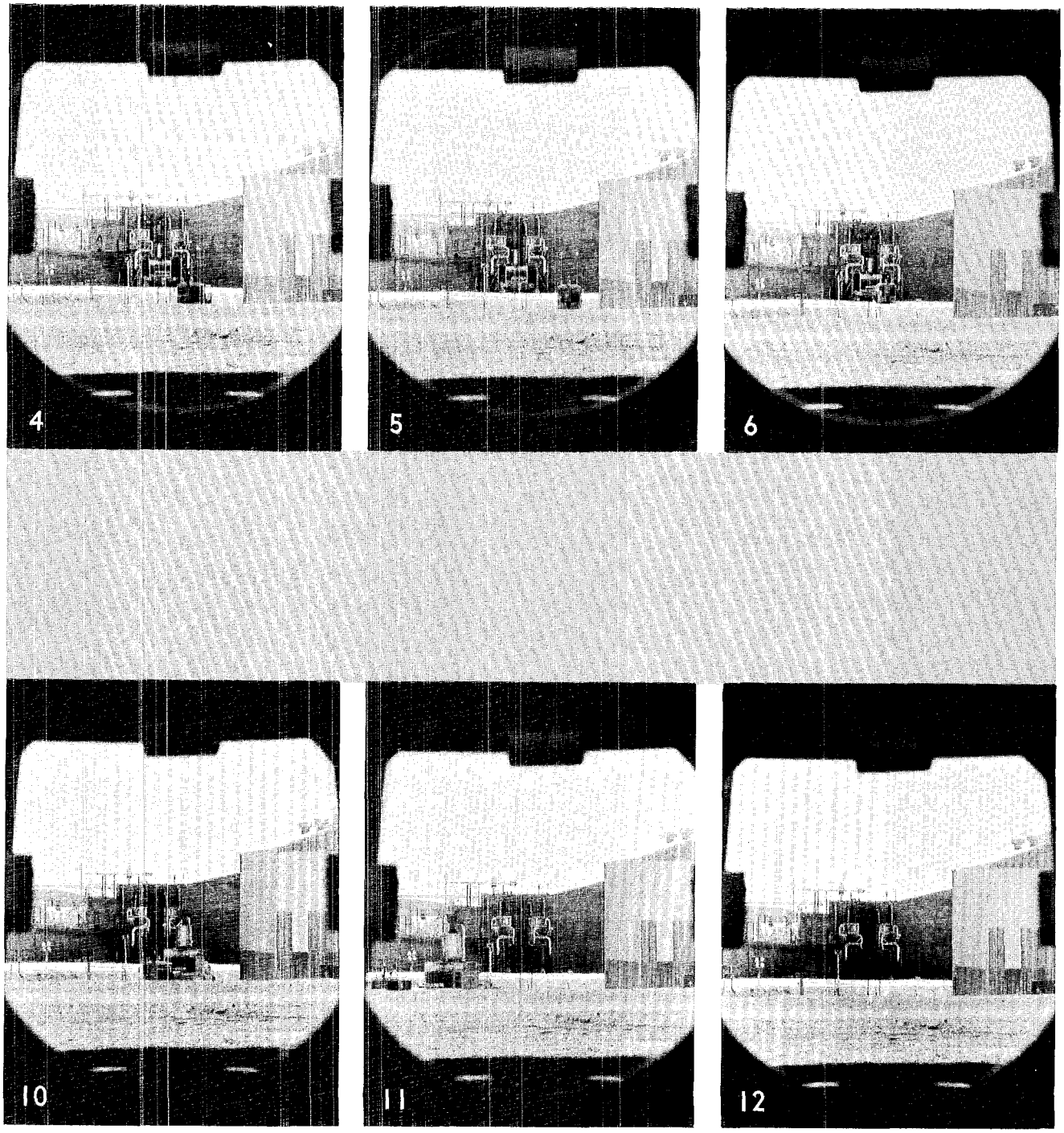


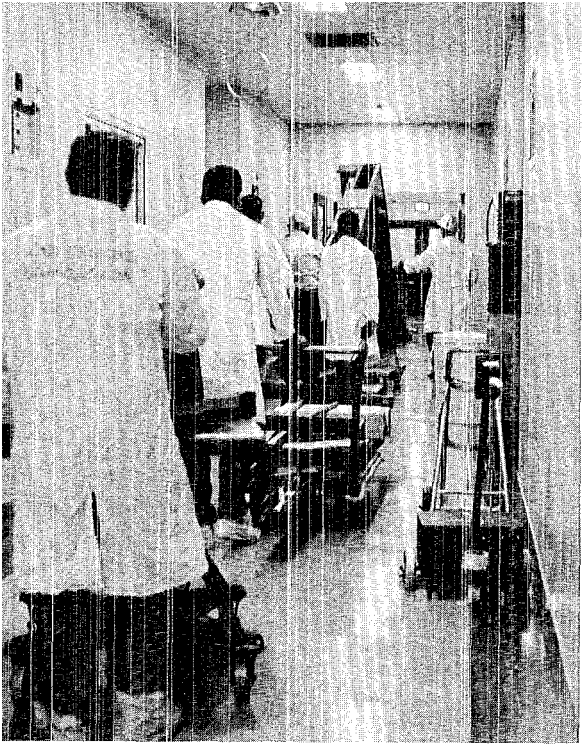




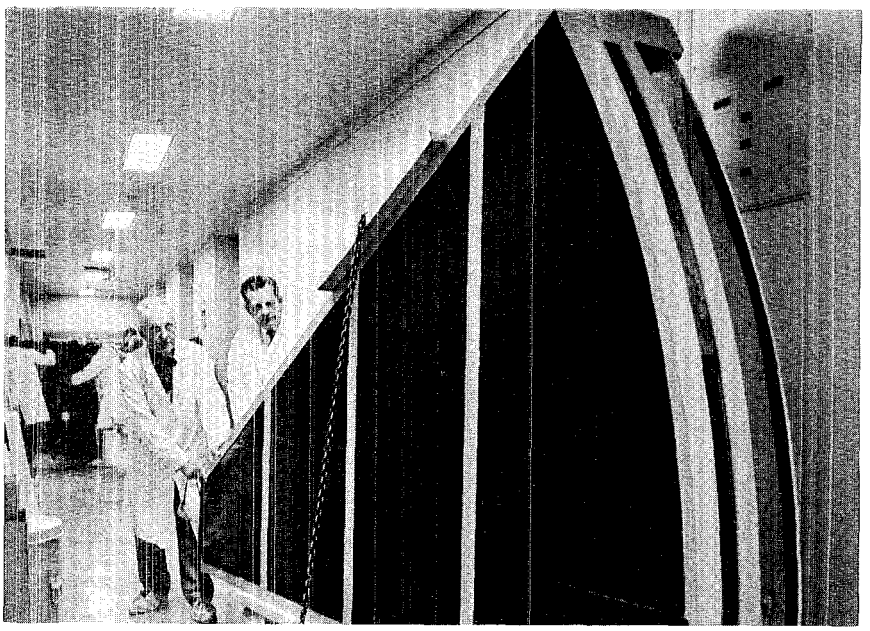
Phoebus 1B moved off the test pad and back to the R-MAD building five days after full power run. This sequence of photos was taken by Robert PerLee, D-8, operating a remote-control camera that is housed in bunker north of test cell. Cameras are protected by four feet of concrete, and keystone effect around edges of photos is formed by clamps holding one of the mirrors used to direct image at camera inside bunker. First photo shows shield still around reactor. Then, as sequence progresses, shield opens, showing reactor inside. In fourth photo,



electric locomotive—controlled from the master control room in the R-MAD building two miles away—moves in on the tracks of what has been nicknamed the "Jackass & Western Railway." Reactor is then disconnected hydraulically from test cell and attached to the locomotive which pulls it off the test pad and down the tracks to R-MAD, leaving an empty shield. (Metal building at right also moves on tracks and is rolled in to protect reactor from the elements during the few weeks a reactor is on the test pad before the run.)



Zia riggers and CMB-1 technicians join in a retirement parade for a 23-year-old spectrograph.



Robert T. Phelps, left, CMB-1 associate group leader, and Group Leader Charles F. Metz start their old spectrograph on the road to retirement as a new piece of equipment is moved into place in the background.

1944 Pu Analyzer

Old Spectrograph Mothballed

By Bill Regan

Another piece of laboratory equipment which served a useful and possibly historic purpose in the hectic days of development for the first fission bomb went out of service last month when CMB-1 replaced a vintage 1943 Jarrell-Ash spectograph with a shiny new Mark IV from the same company.

First significant spectro-chemical analysis of plutonium in milligram quantities was made at Los Alamos by Norman H. Nachtrieb in early 1944, using the old model JACO, described in a catalogue as a fully-automatic, stigmatic, Wadsworth mounted, large grating spectrograph.

Earlier analyses had been made at Berkeley by the discoverers of plutonium, Glenn T. Seaborg, Joseph W. Kennedy and Arthur Wahl in March, 1943, and also by a Chicago Metallurgical Laboratory group in August of the same year. However, only a few micrograms were available for study during this earlier period.

The larger samples--several milligrams--supplied to Los Alamos in 1944 made it possible to achieve more precise measurements on impurities when present at lower concentrations. In addition, gram quantities permitted investigations of the physical properties of element 94 such as the allotropic forms with different crystalline structures and other distinguishing characteristics.

CMB-1 Group Leader Charles Metz recalled an interesting sidelight on the purchase of the 1943 spectrograph. The instrument was already loaded for shipment to the International Nickel Company in Canada when D.P. Mitchell, then head of procurement at Site Y (Los Alamos), exercised a priority high enough to divert the equipment from its original purchaser to a then secret destination and use on the Pajarito Plateau in the fall of 1943. It was set up in D building of the wartime laboratory near Ashley Pond.

According to Metz, the old spectrograph is still a useful instrument but is being replaced because improvements have been made in methods of analysis which require a faster spectograph to get down to much lower concentration limits. For example, the analysis for beryllium is less than one part per billion. The new instrument will allow analysis for more than 30 impurity elements.

Other advantages of the new model are better resolution, a 50 per cent longer spectrum and dual plane gratings of 15,000 and 30,000 lines per inch. James F. Murphy and William M. Myers will operate the new equipment.

short subjects

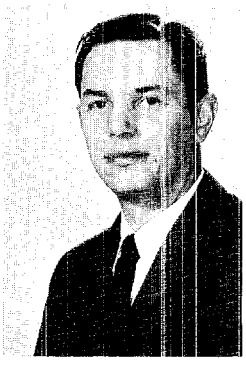
Louis Rosen, MP division leader, has been elected for a two-year term as a member of the executive committee of the American Physical Society's Division of Nuclear Physics.

Other officers elected include three former LASL employes. They are Leonard I. Schiff, chairman, who was at LASL in 1945 and 1946; Henry H. Barschall, vice chairman, a LASL staff member from 1943 to 1946 and again in 1951 and 1952; and Joseph L. Fowler, a member of the executive committee, who was in Los Alamos from 1944 to 1950.

Harold Agnew, W division leader, was a speaker at the Air Force Association's 21st anniversary national convention in San Francisco recently.

Agnew was among the speakers at a symposium entitled "The Technological Threat."

Other speakers at the March 14-17 meeting included Secretary of the Air Force Harold Brown and several Air Force general officers.



Donald H. Liebenberg, CMF-9, has been named program director for solar-terrestrial research for the National Science Foundation, Washington, D.C. He has taken a leave of absence from LASL to accept the two-year appointment in which he will be responsible for funding research on solar-terrestrial relations.

Although a cryogenist with the Laboratory, Liebenberg, long interested in solar-terrestrial phenomena, has participated in both LASL airborne eclipse expeditions—in May, 1965, over the South Pacific and in November, 1966, over the South Atlantic east of Buenos Aires. In addition, he made eclipse studies in Canada's Northwest Territories in 1963, in Mellon, Wisc., in 1954 and NSF-sponsored eclipse studies from Danger Island in 1958 and Canary Island in 1959.

While with the NSF, Liebenberg and his family will live in Falls Church, Va.

Bob P. Helgeson, chief of the Nevada extension of the Space Nuclear Propulsion Office (SNPO) since 1962, has been named to the newly established position of deputy manager of the Atomic Energy Commission's Richland, Wash., Operations Office.

Prior to his assignment with SNPO, a joint AEC-NASA office responsible for the administration of the Nuclear Rocket Development Station (NRDS), Jackass Flats, Nev., Helgeson was with Lockheed Missiles and Space Co. Earlier he served as program manager of the Nuclear Development Center, Thiokol Chemical Corporation. While with Thiokol, he was also a staff member at the Los Alamos Scientific Laboratory where he participated in the Kiwi-A reactor portion of the Rover program.

Helgeson will begin his duties at Richland about April 10.

Pending selection of a replacement for Helgeson at SNPO-N, John P. Jewett, assistant chief for administration, will serve as chief of the extension.

Wernher von Braun, left, director of the Marshall Space Flight Center, visited the Nuclear Rocket Development Station with LASL director Norris Bradbury in mid-February, when Phoebus 1B was scheduled to run. However, weather conditions caused a week's delay in the full power run, and both returned to their respective homes.

The Technical Side

American Physical Society, 1966 Autumn Meeting, Nashville, Tenn., Dec. 1-3:

"Experiments on Plasma Stream Injection Across a Magnetic Field" by J. E. Hammel, P-17. (Invited paper)

International Symposium on Atomic, Molecular and Solid-State Theory, Sanibel Island, Fla., Jan. 16-21:

"Numerical Results from the KKR-Z Method" by J. H. Wood, CMF-5.

"SCF APW Energy Bands in Copper" by E. C. Snow, CMF-5, and J. T. Waber, formerly LASL.

Talk and Demonstration at Los Alamos High School, Los Alamos, N.M., Jan. 23:

"Cryogenics" by F. J. Edeskuty, CMF-9.

AIAA Meeting, New York, N.Y., Jan. 23-26:

"A Study of a Nuclear Thermionic Propulsion System" by E. W. Salmi, N-5.

Presentation at Seminar, High Altitude Observatory, Boulder, Colo., Jan. 30-31:

"Interaction of the Solar Wind with the Magnetosphere" by J. T. Gosling, P-4.

Presentation at Symposium on the Zodiacal Light and the Interplanetary Medium, Honolulu, Hawaii, Jan. 30-Feb. 3:

"Vela Observations of the General Characteristics and Filamentary Structure of the Solar Wind" by I. B. Strong, J. R. Asbridge, S. J. Bame, all P-4, and A. J. Hundhausen, T-12.

American Physical Society Meeting, New York, N.Y., Jan. 30-Feb. 2:

"High-Beta Plasmas in Theta-Pinches and Cusp Experiments" by F. L. Ribe, P-12. (Invited paper)

Presentation at Tutorial Symposium on Circuit Design by Computer, Department of Electrical Engineering, School of Engineering and Science, New York University, New York, N.Y., Feb. 2:

"NET-1 with Application to Active Circuit Design" by A. F. Malmberg, T-7.

Presentation to Federal Executives Association, AEC Albuquerque Operations Office, Albuquerque, N.M., Feb. 3:

"The Proposed Los Alamos Meson Factory—Plans and Purposes" by Louis Rosen, MP-DO. (Invited talk)

Presentation at Research Institute for Physics, Stockholm, Sweden, Feb. 6:

"Nuclear State in the Continuum" by R. B. Leachman, P-12.

Presentation at Meeting of New Mexico Scientists Engaged in Laser Related Research, Physics Department, New Mexico State University, Las Cruces, N.M., Feb. 8-9:

"Biological Applications of Lasers: Light-Scattering and Fluorescence of Mammalian Cells" by M. A. VanDilla, H-4. (Invited paper)

"Laser Problems of Interest to J Division" by P. N. Mace, J-8. (Invited paper)

"Partial Fringe Holographic Plasma Interferometry" by F. C. Jahoda, P-15, R. A. Jeffries, GMX-7, and G. A. Sawyer, P-15.

"Perturbation of a Cesium Plasma by Intense Laser Light" by D. E. Michael, P-13.

Presentation at Seminar, University of Utah, Salt Lake City, Utah, Feb. 11:

"Computer Bounce Model of a Theta-Pinch Compression" by J. A. Palsedge, P-18.

Presentation at Seminar, Nuclear Engineering Students, University of Washington, Seattle, Wash., Feb. 13:

"Experimental Work on Cavity Type Critical Assemblies" by C. C. Byers, N-2.

Presentation at Colloquium, Sandia Corporation, Albuquerque, N.M., Feb. 16:

"Quasar-Stellar Objects" by James Terrell, P-DOR.

Presentation at Symposium on Tritium, sponsored by Sandia Corporation, Albuquerque, N.M., Feb. 16-17. (Classified Meeting)

Health Problems Associated with the Acceleration of Tritons in a 2.5 MeV Van de Graaff." by M. J. Engelke, H-1.

American Institute of Mining, Metallurgical and Petroleum Engineers Meeting, Los Angeles, Calif., Feb. 19-23:

"Anion Exchange of Uranium (VI) on Dowex 1x4 from Nitric Acid Solutions" by D. B. James, formerly LASL.

Presentation at Colloquium, Illinois Institute of Technology, Chicago, Ill., Feb. 22:

"Magnetic Flux Compression" by C. M. Fowler, GMX-6.

American Physical Society Meeting, Austin, Texas, Feb. 23-25:

"The Anomalous Dip in Total Reaction Cross Sections in the Nickel Region" by J. F. Dicello, Jr., P-12, G. J. Igo, P-DOR, and M. L. Roush, University of Maryland.

"Variation of ^{32}S Width with Energy and Spin" by R. B. Leachman, P-12, and Peter Fessenden, formerly LASL.

Second Annual Conference on Pure and Applied Mathematics, New Mexico Institute of Mining and Technology, Socorro, N.M., Feb. 25:

"On Secondary Bifurcation of Eigenfunctions of Hammerstein Operators" by G. H. Pimbley, Jr., T-8.

Presentation at 3rd Annual Mössbauer Symposium, New York, N.Y., Jan. 29:

"Mössbauer Spectroscopy of the 29.4 keV Gamma Ray of K^{40} from the Reaction $K^{39}(n, \gamma)K^{40}$, by E. B. Shera, P-2, and D. W. Hafemeister, formerly LASL. (Invited paper)

Presentation at Meeting of the American Medical Society, Santa Fe, N.M., Feb. 14:

"A Travelogue on Southern Spain" by W. H. Langham, H-4. (Invited talk)

Presentation at Symposium on Instrumentation and Health Physics Problems Concerning Tritium, Sandia Corporation, Albuquerque, N.M., Feb. 16:

"Early History and Health Physics Review" by W. H. Langham, H-4. (Invited paper)

Presentation at College of William and Mary, Williamsburg, Va., Feb. 17:

"Muon Capture and O^{16} Wavefunctions" by G. E. Walker, T-9.

Presentation at Annual Meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers, Los Angeles, Calif., Feb. 21-24:

"Some Recent Augmented Plane Wave Calculations" by J. H. Wood, CMF-5.

Presentation at American Institute of Chemical Engineers Symposium, Houston, Texas, Feb. 22:

"Explosion Suppression by Room Inerting" by J. R. Penland, H-3.

Presentation at Meeting of the Local Chapter of the Health Physics Society, Atlanta, Ga., Feb. 22:

"The Plutonium Contamination Incident in Spain" by W. H. Langham, H-4. (Invited talk)

Presentation at Meeting of Local Chapter of the Health Physics Society, Oak Ridge, Tenn., Feb. 27:

"Radiation Responses of Man in the Intermediate Dosage Range" by W. H. Langham, H-4. (Invited paper)

new hires

CMB Division

Larry L. Taylor, Las Cruces, N.M., CMB-8

James P. Irwin, Las Cruces, N.M., CMB-8 (Rehire)

Engineering Department

James Singer, Espanola, N.M., ENG-3

GMX Division

Neal A. Lundgaard, Jr., Oklahoma City, Okla., GMX-1

Bobby L. Pangburn, Espanola, N.M., GMX-3

Frank W. Reeves, Los Alamos, GMX-3

Gary C. Powley, Oklahoma City, Okla., GMX-4

Jerry A. Morgan, Austin, Texas, GMX-6

Virgil W. Mollett, Enid, Okla., GMX-7 (Casual)

John R. Barnes, Los Alamos, GMX-8

Harvey Colyer, Borger, Texas, GMX-11 (Rehire)

H Division

Joseph M. Machinist, Austin, Texas, H-4

K Division

Jack L. Parker, Salt Lake City, Utah, K-1

Jack N. Wofford, Rolling Hills, Calif., K-4

MP Division

Clifford M. Plopper, Livermore, Calif., MP-1

N Division

June Jennings, Los Alamos, N-1

P Division

James A. Bergey, Flint, Mich., P-1 (Rehire)

Roger K. Walter, Salt Lake City, Utah, P-3

Shops Department

Gilbert J. Gonzales, Santa Fe, N.M., SD-DO

Marin Mier, Santa Fe, N.M., SD-DO

Clyde R. Waller, Boulder, Colo., SD-1

Orvil D. Harkleroad, Santa Fe, N.M., SD-5

Ronald F. Motsenbocker, Los Alamos, SD-5

Supply & Property Department

Darlene M. Whittemore, Los Alamos, SP-12 (Casual-Rehire)

T Division

Raymond A. Brewer, Garden City, N.Y., T-1

Linda R. Druktenis, Los Alamos, T-1

Frederick E. Ross, Santa Fe, N.M., T-1

Cheryl A. Sams, Meeker, Okla., T-1

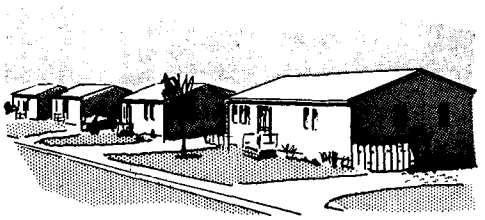
Two CMB Groups Receive Safety Awards

Two outstanding safety records were honored by the Los Alamos Scientific Laboratory last month when Director Norris E. Bradbury presented award plaques to group CMB-3 for 23 years without a disabling accident and to CMB-6 for 1,000,000 man hours without a lost-time accident.

James Taub, CMB-6 group leader, accepted the plaque for the 112 members of his materials technology group at a ceremony in the Administration building auditorium Feb. 10. Three days later, a similar presentation was made to Melvin G. Bowman, CMB-3 co-group leader, in the DP East site conference room. Dwayne T. Vier is the other group leader for CMB-3.

Both groups were cited by Laboratory Safety Director Roy Reider in pre-award announcements which pointed out the difficulties of maintaining such records in potentially hazardous operations which cover a wide variety of work and techniques and utilize many different types of equipment.

20 years ago in los alamos



200 NEW DENVER STEELS !

Culled from the files of The Los Alamos Times by Robert Y. Porton

Governor to Sign SB-200 Election Bill

Senate Bill 200, the measure which embodies the most eagerly sought objective of Los Alamos residents—their right to participate in state elections—passed the New Mexico House of Representatives this Wednesday, by roll call vote of 30 to 12. It was introduced by nine members of that body. The bill, which had earlier been passed unanimously by the Senate will now be sent to Governor Thomas Mabry, who has expressed approval of the measure, and is expected to sign it in the near future. (Editor's note—He did.)

Last Month One of Driest

February fell far below normal in quantity of rain and snowfall, which foresees a probable dry summer, according to the maintenance division of the Zia Company. The departure from normal snowfall was minus 7.2 inches. Twenty-four of the 28 days during the month were either clear or partly cloudy.

Adults Review Teen Problem

The headaches and heartaches of the adolescent, and what to do about them, will be discussed by a committee of their closest friends—mothers, fathers and teachers—Monday in the high school. Following a panel discussion, open to the public, the speakers will answer questions from the floor. The panel will be the third of four child guidance discussions under the joint sponsorship of the Parent-Teachers Association and the Mesa Club.

From Sally Taub's "Market Basket" Column

Prices this week at the Hill's Commissary include large peanut butter at 26 cents a jar; cut beets, 7 cents a can; salmon, 31 cents; marshmallows, 6 cents per package; No. 2 cans of orange juice, 8 cents; 250-count paper napkins, 10 cents; and garlic salt, 9 cents.

Bids Open for 200 Prefabs

Bids were offered in a lump-sum package for the construction of 200 steel prefabricated houses similar to the 58 already set up here. The AEC has purchased the units from Fox Metal Products Company, Denver, in a total sale which amounted to more than $500,000. The houses, expected to materially increase the number of permanent dwellings available to the community, will be located on a site near the western housing development.

what's doing

BLACK & WHITE MASKED BALL: Saturday, April 8, 9 p.m. to 1 a.m. Music by the All Stars. Variety of Mexican food available prepared by the LULACs. $6 couple, $3 single. Reservations necessary. Telephone Mrs. Joseph Kemme, 2-3574. Sponsored by the Hospital Auxiliary of the Los Alamos Medical Center, Inc. Proceeds to the hospital Emergency Fund.

FILM SOCIETY: Wednesday, April 19, 7 and 9:15 p.m., "Kwaidan," Japanese ghost stories. Civic Auditorium. Admission by single ticket, 90 cents, or season ticket, $4.

OUTDOOR ASSOCIATION: No charge, open to the public. Contact leader for information about specific hikes.

- Sunday, April 9, Buckman-Otowi Mesa from Otowi Bridge, Ed Kmetko, leader, 2-3173.
- Saturday, April 22, Cerro Pedernal, Mike Williams, leader, 2-3616.
- Thursday, April 27, Meeting—election, annual business at the home of Dibbon Hagar, 3710 Gold Street, Apt. 6, 2-6209.
- Saturday, April 29, Jemez Falls-Battleship Rock, Marlene McKee, leader, 2-4988.

PUBLIC SWIMMING, Los Alamos High School Pool. Adults 25 cents, children 15 cents. Saturday and Sunday 1 to 6 p.m.; Monday, Tuesday and Wednesday, 7:30 to 9:30 p.m.

SWIM & TRIM: Free Red Cross recreational swimming class open to all women, Saturdays, noon to 1 p.m., Los Alamos High School Pool. Telephone Mrs. L. K. Neher, 2-4094, for more information.

SWIMMERS CLUB OF LOS ALAMOS: Adults, Sundays from 7 to 9 p.m., Los Alamos High School Pool.

ICE RINK is closed for the season.

Los Alamos To Host Photo Conference

New Mexico Industrial Photographers Association will meet in Los Alamos April 1 and 2 for their eighth annual conference.

Robert H. Martin, D-8, is association president. Two LASL staff members will be on the program. Robert R. Brownlee, J-15, will describe the "Recent South American Eclipse Expedition," and Wright H. Langham, H-4 group leader, will discuss "Palomares, Spain, Experiences."

Old mining claim dated March, 1928, stakes out part of Nevada Test Site for mining rights to quartz in the name of Golden Eagle mining company. Ted Crawford, left, and Phil Miller, both J-8, found the old document in the Control Point 1 area while they were working on test operations for last month's Persimmon underground test.

BACK COVER:

Like the swallows of Capistrano and the buzzards of Hinkley, the geese on Ashley Pond in Los Alamos traditionally signify, if not the beginning of spring, at least the end of winter. *(Photo by PUB's Bill Regan).*

Henry T. Motz
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Los Alamos, New Mexico 87544